Mobility Strategy

(GSM+U900+U2100+LTE1800+LTE2600)

Document Revision Record

Date	Revise Record	Remark
13th Sep 2012	1. Add UE cell selection procedure and related parameter 2. Change proposed SPriority in UMTS side to default 4 for all U900 and U2100 cells to avoid the possibility to affect cell reselection in UMTS 3. Change the value setting for UTranCellID from (RNC ID x 65536 + RNC cell ID) to 3G Cell ID only since 3G CellID in Maxis KV network is unique 4. Add description for parameter BlindHoA2ThdOffset assist to trigger InterRAT blind redirection 5. Add description for case 3G SIM card be put into 4G UE if enable 3G to 4G reselection or redirection, and solution for Maxis LTE phase 1 6. Add system information snapshot to show LTE and 3G cell select & reselect priority	
16th Oct 2012	1. Re Capture the SIB3 indicating the LTE cell reselection priority 2. Add description for the 4S timer for CSFB 3. Correct the Blind Redirection trigger parameter BlindHoA2ThdOffset	
8th Mar 2013	1. Add introduction for two parameters for UMTS layer priority and reselection threshold when define 2G to LTE reselection 2. Add introduction for UMTS to LTE redirection 3. As confirmed between Maxis and Huawei in 7th Mar, L2U mobility strategy in connection mode changed, before L2U based on handover prioritize to U900 then U2100 F2, new strategy is to do blind redirection to UMTS F2 only. 4. Maxis confirmed L1800 set higher reselection priority (priority 6) than L2600 (priority5)	
12th Mar 2013	1. Huawei R&D confirmed that 3G Ec/Io will be considered when introduce 2G to LTE reselection. It is recommended by Huawei to do trial to double confirm no impact to existing 2G to 3G reselection if enable 2G to LTE reselection	V 1.9
28th Mar 2013	1. Set priority of U900 for L2U reselection to 3, which is lower than U2100 priority (4), so UE will prioritize to reselect to U2100 if LTE is poor, if U2100 still poor then try U900, due to U900 is not really continuously coverage but will provide larger coverage compare to co-located U2100 2. Review all parameter setting and correct the parameter name typo	V 1.95

Remark:

1) All the parameters and MML commands in this document are based on eRAN3.0
2) Parameters may need to fine tune according to real network environment during optimization

Document Revision Record

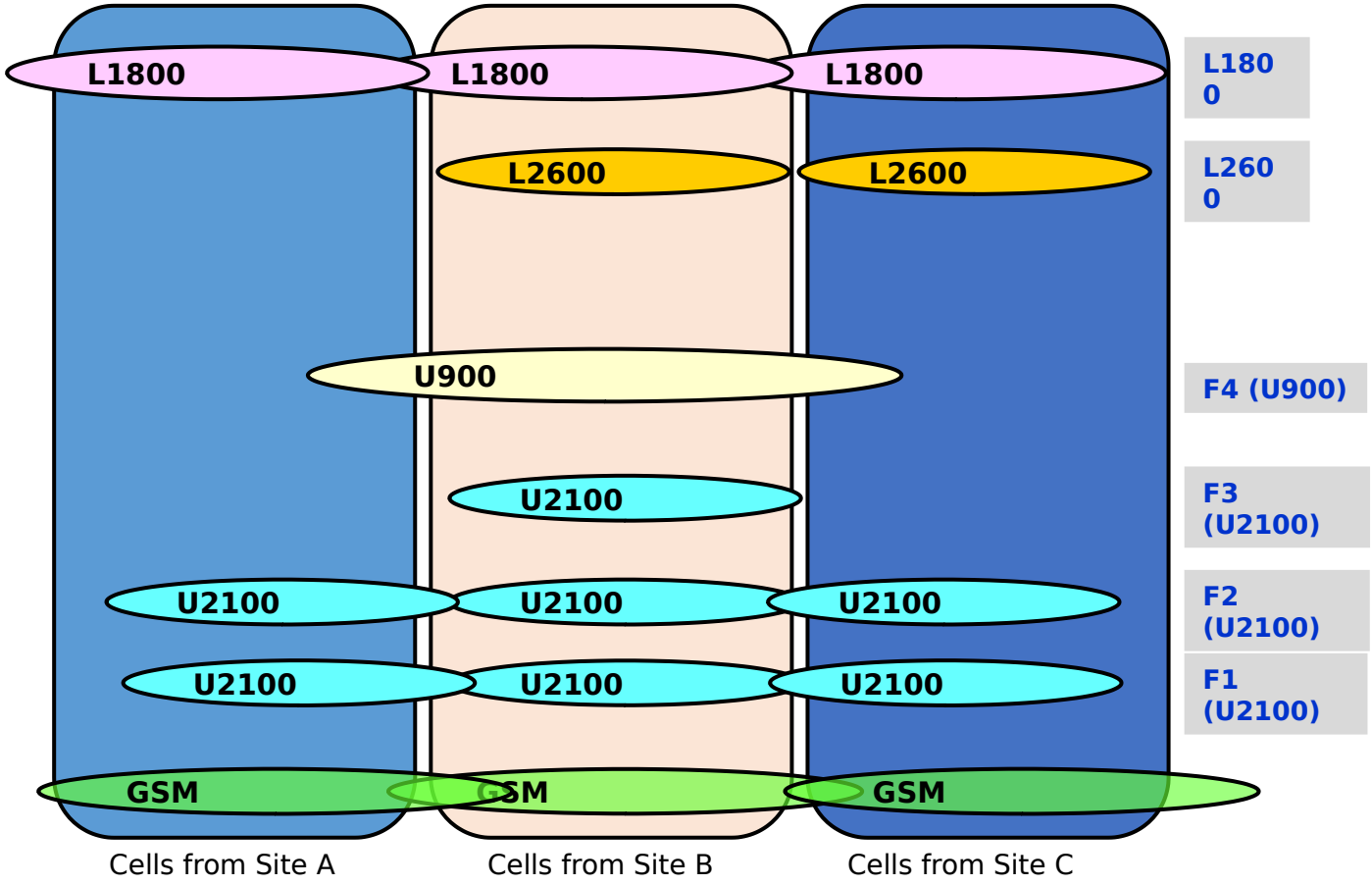
Date	Revise Record	Remark
17th Jun 2013	1. Change Inter-Frequency MLB parameter as per mutual agree based on trial result 2. Set cell select and reselection between LTE 1800 and LTE 2600 same priority (6) within LTE, while remain 3G/2G to LTE 1800 with higher priority (6) than to LTE 2600 (priority 5)	2.0
10th Sept 2013	1. Change U/G to LTE reselection priority for entire network (change in 2G & 3G), before L1800 has the highest priority (6), now L2600 has the highest priority (6) for GU to L reselection. Cell reselection between L1800 and L2600 remain same within LTE (both configure same priority 6)	2.1
10th-Sep-2014	1. For push the user to L2600. we need set the different priority for the L2600(6) and L1800(5) for the reselection 2. L2600 frequency=2850	2.2
15th-Nov-2014	1. UtranCELL ID already be seperated to two parameters (RNC ID and RNC Cell ID) on Eran6.0. Updated on the Page40 of this presentation.	2.3
25th-Nov-2014	1. Loaddiffload of Inter-fre MLB had been updated. (L2600=20, L1800=5). Result on the L1800 user push to L2600 is easier and hopefully keep user on the L2600.	2.4
6th-Feb-2015	1. For push the user from 3G to LTE when UE on idle mode • MOD CELLRESEL: SNonIntraSearch=8 (original value=9) • MOD CELLRESEL: ThrshServLow =6 (original value=7) • MOD EUTRANINTERNFREQ: THRESHXLOW=10; (Original value=11)	2.5

Remark:

1) All the parameters and MML commands in this document are based on eRAN6.0
2) Parameters may need to fine tune according to real network environment during optimization

Maxis Radio Network Structure

- 3 RAT in Maxis Radio Network: LTE, UMTS, GSM
- 5 layers involved in LTE Mobility Strategy: L1800, L2600, U900, F2(U2100) and GSM
- L1800 is sharing antenna with GSM1800 and L2600 is sharing antenna with U2100



Basic idea of Mobility Strategy

- Idle Mode:
  - L<->L: Intra-Freq, Inter-Freq reselection
  - L->U: coverage based reselection
    - U900 has lower priority than U2100
  - GU->L: reselection based on priority
- Connection Mode:
  - L<->L: Intra-Freq, Inter-Freq Handover
  - L->U: coverage based Handover for PS service and CSFB for Voice service
    - ~~U900 has higher priority than U2100~~
    - As confirmed between Maxis and Huawei in 7th Mar, L2U mobility strategy in connection mode changed, before L2U based on handover prioritize to U900 then U2100 F2, new strategy is to do blind redirection to UMTS F2 only.

Cell Selection procedure

36304 5.2.3.1 Cell Selection process Description

- The UE shall use one of the following two cell selection procedures:

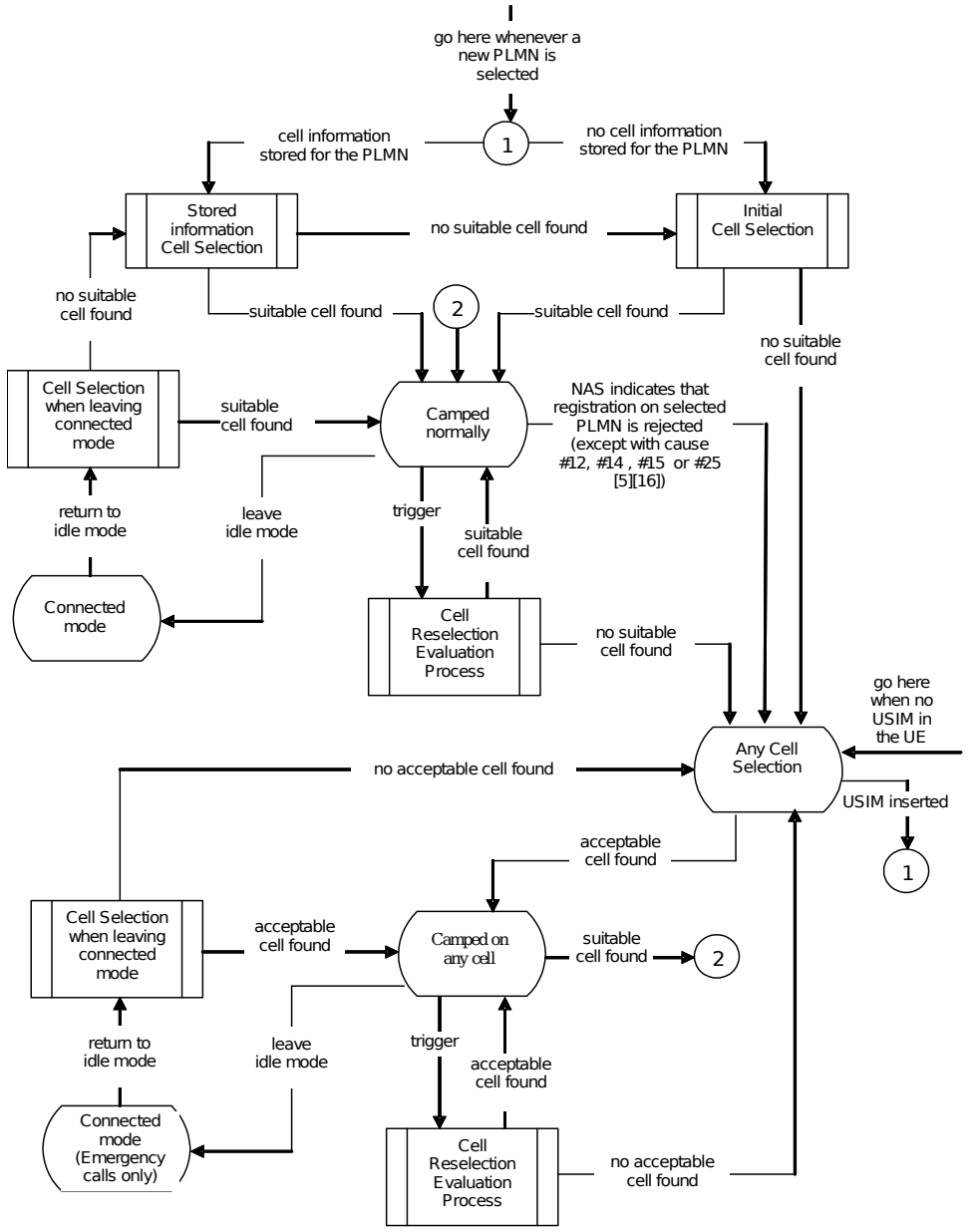
- **a) Initial Cell Selection**

  This procedure requires no prior knowledge of which RF channels are E-UTRA carriers. The UE shall scan all RF channels in the E-UTRA bands according to its capabilities to find a suitable cell. On each carrier frequency, the UE need only search for the strongest cell. Once a suitable cell is found this cell shall be selected.

- **b) Stored Information Cell Selection**

  This procedure requires stored information of carrier frequencies and optionally also information on cell parameters, from previously received measurement control information elements or from previously detected cells. Once the UE has found a suitable cell the UE shall select it. If no suitable cell is found the Initial Cell Selection procedure shall be started.

Note: Priorities between different frequencies or RATs provided to the UE by system information or dedicated signalling are not used in the cell selection process.



Cell Selection procedure

36.304 **5.2.3.2 Cell Selection Criterion**

The **cell selection criterion S** is fulfilled when:

$Srxlev > 0$ AND $Squal > 0$

where:

$Srxlev = Q_{rxlevmeas} - (Q_{rxlevmin} + Q_{rxlevminoffset}) - P_{compensation}$

$Squal = Q_{qualmeas} - (Q_{qualmin} + Q_{qualminoffset})$

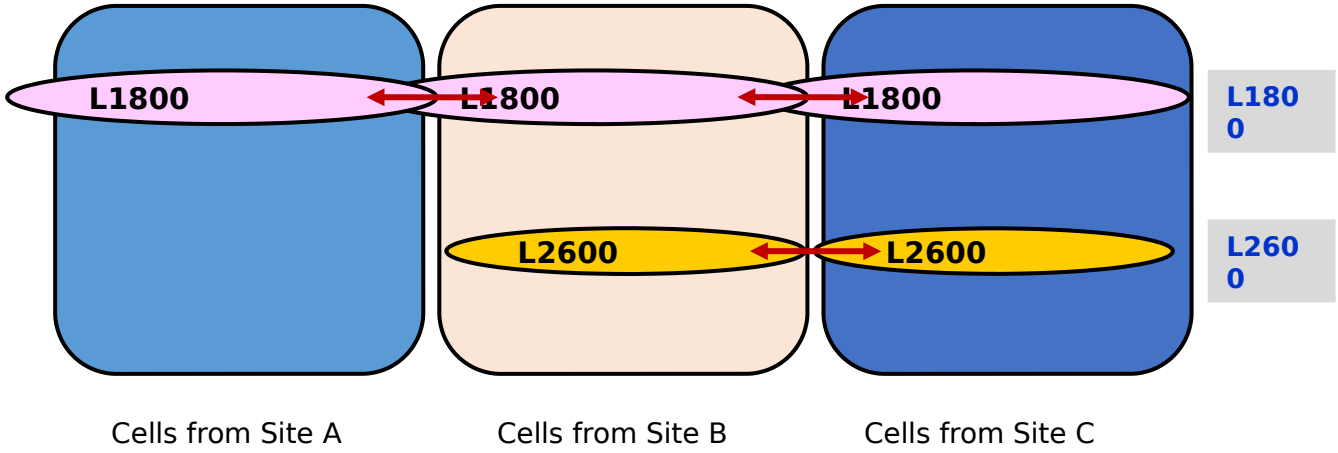
Where:

Srxlev	Cell selection RX level value (dB)	
Squal	Cell selection quality value (dB)	
$Q_{rxlevmeas}$	Measured cell RX level value (RSRP)	
$Q_{qualmeas}$	Measured cell quality value (RSRQ)	
$Q_{rxlevmin}$	Minimum required RX level in the cell (dBm)	-128dBm
$Q_{qualmin}$	Minimum required quality level in the cell (dB)	NA, means infinite. Only judge by RSRP
$Q_{rxlevminoffset}$	Offset to the signalled $Q_{rxlevmin}$ taken into account in the Srxlev evaluation as a result of a periodic search for a higher priority PLMN while camped normally in a VPLMN	0
$Q_{qualminoffset}$	Offset to the signalled $Q_{qualmin}$ taken into account in the Squal evaluation as a result of a periodic search for a higher priority PLMN while camped normally in a VPLMN	0
Pcompensation	$\max(P_{EMAX} - P_{PowerClass}, 0)$ (dB)	
P_{EMAX}	Maximum TX power level an UE may use when transmitting on the uplink in the cell (dBm) defined as P_{EMAX} in [TS 36.101]	
$P_{PowerClass}$	Maximum RF output power of the UE (dBm) according to the UE power class as defined in [TS 36.101]	Default: Null, parameter name: UePowerMax

The signalled values $Q_{rxlevminoffset}$ and $Q_{qualminoffset}$ are only applied when a cell is evaluated for cell selection as a result of a periodic search for a higher priority PLMN while camped normally in a VPLMN [5]. During this periodic search for higher priority PLMN the UE may check the S criteria of a cell using parameter values stored from a different cell of this higher priority PLMN.

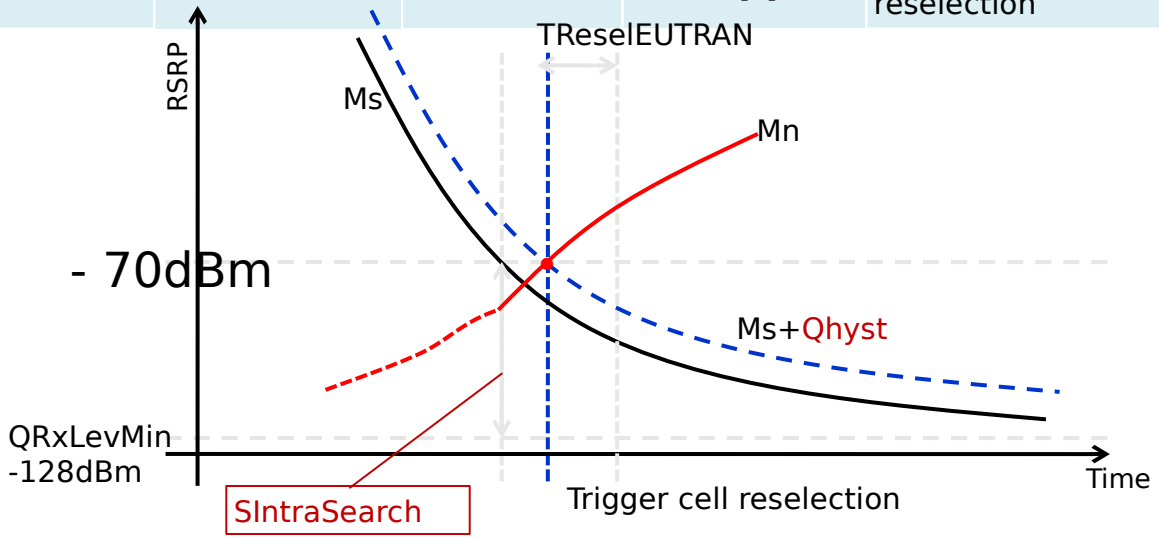
LTE <-> LTE (Intra-Freq) – Idle Mode Cell Reselection

- Intra-Frequency reselection will be triggered when UE moves toward out of the serving cell coverage area
- UE will reselect to the best cell that the RSRP is better than the serving cell



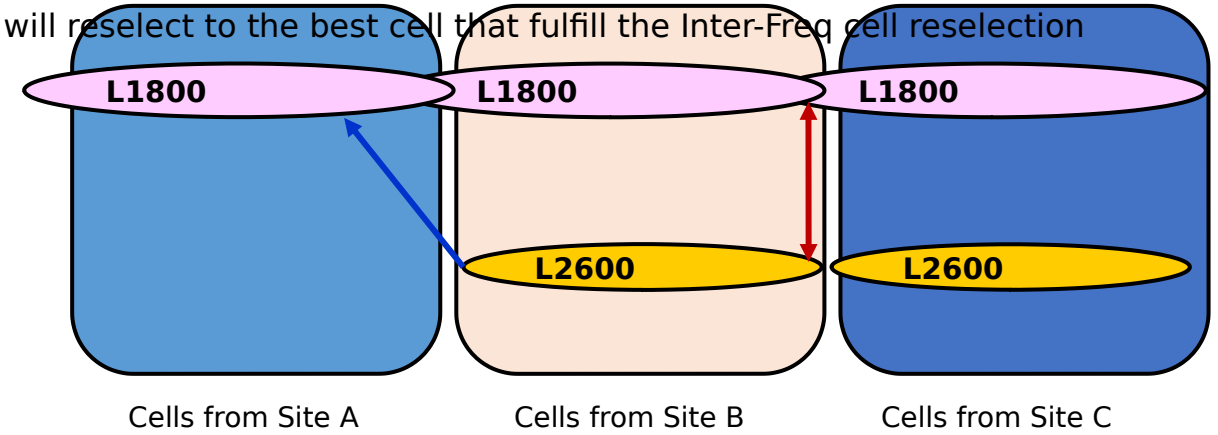
LTE <-> LTE (Intra-Freq) – Idle Mode Cell Re

LTE Parameter	MML Command	Default value	Recommended value	Comments
SIntraSearchCfgInd	MOD CELLRESEL	CFG	CFG	Enable Intra-Freq measurement based on serving cell signal. If set to Not-CFG, then UE will always scan Intra-Freq neighbor
SIntraSearch		29	29 [2dB] (-70dBm)	Measurement triggering threshold for reselection to Intra-Frequency cells
Qhyst		4	4 (dB)	Hysteresis for serving cell when ranking
QRxLevMin		-64	-64 [2dBm] (-128dBm)	Minimum required RX level for the cell to become a candidate during cell reselection
TReselEUTRAN		1	1 [s]	Time threshold for EUTRAN cell reselection



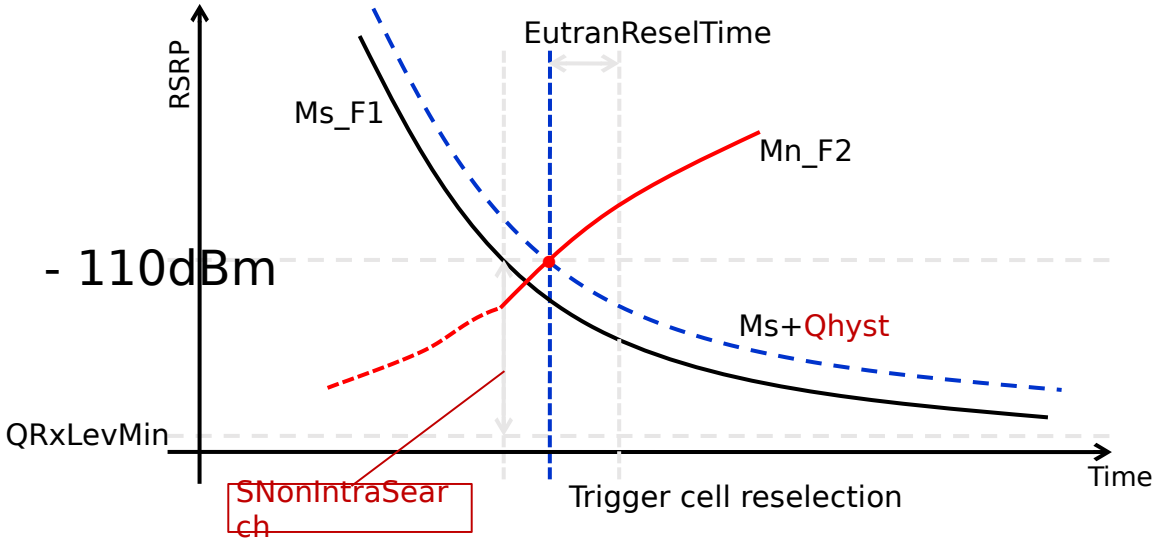
LTE <-> LTE (Inter-Freq) – Idle reselection (Same Priority)

- **Huawei propose to Maxis** that same reselection priority for L1800 and L2600 if they have same bandwidth
- Inter-Frequency reselection will be triggered when UE moves out of the serving frequency coverage area
- UE will reselect to the best cell that fulfill the Inter-Freq cell reselection



L1800	6
L2600	6

Reselection Priority between two LTE layers

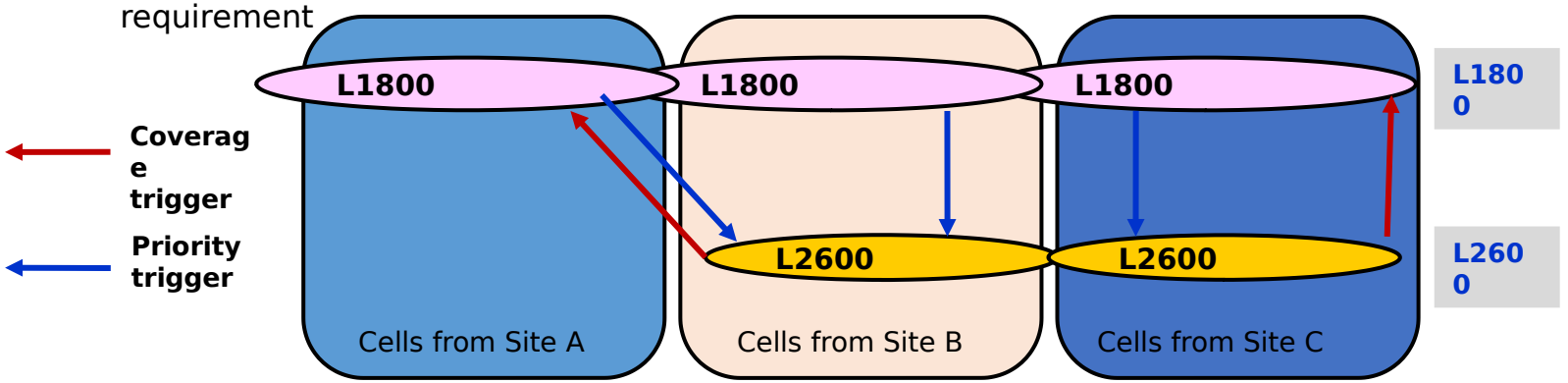


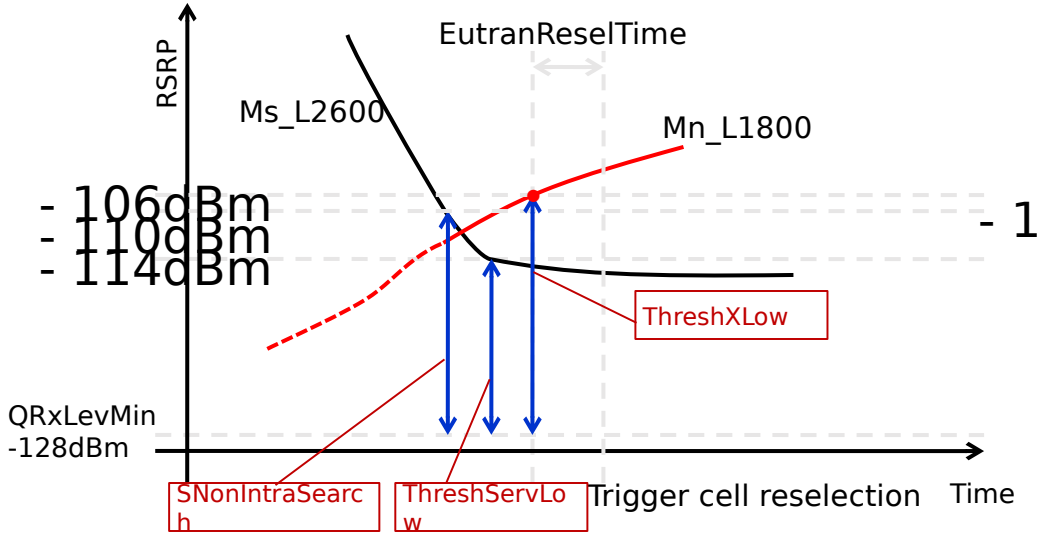
LTE <-> LTE (Inter-Freq) – Idle reselection (Same Priority)

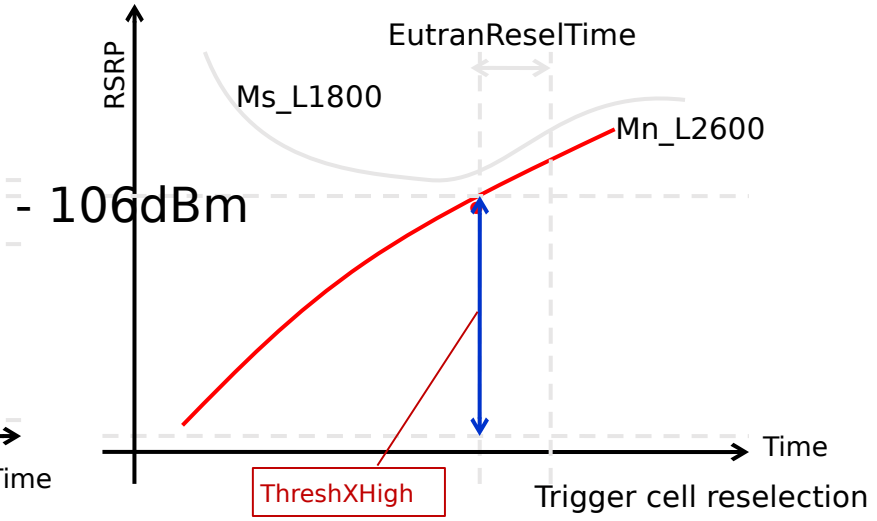
LTE Parameter	MML Command	Default value	Recommended value	Comments
CellReselPriority	MOD CELLRESEL	1	6	L1800 and L2600 cells have same cell priority which is higher than UMTS
SNonIntraSearchCfgInd		CFG	CFG	Enable Inter-Freq measurement
SNonIntraSearch		10	9 (2dB) (-110dBm)	Measurement triggering threshold for scan Inter-Frequency /Inter-RAT cells (-110 = -128+2*9)
Qhyst		4	4 (dB)	Hysteresis for serving cell when ranking
QRxLevMin		-64	-64 [2dBm] (-128dBm)	Minimum required RX level for the cell to become a candidate during cell reselection
TReselEUTRAN		1	1 [s]	Time threshold for EUTRAN cell reselection
QRxLevMin	ADD EUTRANINTERNFREQ	-64	-64 [2dBm] (-128dBm)	Minimum required RX level for the cell to become a candidate during cell reselection
EUTRANReselTime		1	1 [s]	Time threshold for inter-frequency cell reselection
DlEarfcn		NA	1299 for L1800 2850 for L2600	Define L1800 as L2600 cell reselection Inter-Freq Define L2600 as L1800 cell reselection Inter-Freq
CellReselPriorityCfgInd		NOT_CFG	CFG	If this parameter is not specified or set to NOT_CFG, then UE won't reselect to neighboring cells on the frequency
CellReselPriority		1	6	L1800 and L2600 cells have same cell priority which is higher than UMTS

LTE <-> LTE (Inter-Freq) – Idle reselection (Different Priority)

- **Huawei propose for Maxis** to set higher reselection priority for frequency with larger bandwidth (Assume L2600 has 20MHz and L1800 has 10MHz bandwidth)
- Inter-Frequency reselection will be triggered when UE moves out of the Higher Priority frequency serving area
- UE will reselect to the Higher Priority frequency once the higher priority frequency fulfill the requirement







LTE <-> LTE (Inter-Freq) – Idle reselection

2014-Sep-10th base on the Fahis meeting

LTE Parameter	MML Command	Default value	Recommended value	Comments
CellReselPriority	MOD CELLRESEL	1	**6 for L2600** **5 for L1800**	L1800 has highest priority followed by L2600, which is higher than UMTS and GSM
SNonIntraSearchCfgInd		CFG	CFG	Enable Inter-Freq measurement
SNonIntraSearch		10	**9**[2dB] (-110dBm)	Measurement triggering threshold for scan Inter-Frequency /Inter-RAT cells (-110 = -128+2*9)
ThrshServLow		10	7[2dB] (-114dBm)	Measurement triggering threshold for reselection to Inter-Frequency /Inter-RAT cells (-114 = -128+2*7)
ThreshXHigh	ADD EUTRANINTERNFREQ	11	11[2dB] (-106dBm)	RX level required for a neighboring cell on the frequency to become a candidate for reselection if the priority of the frequency is higher than that of the serving frequency. Ensure this is > Snonintrasearch and > A2 event (A2ThdRsrp - Hyst) to allow UE has time to look for other LTE frequency and avoid pingpong reselection
ThreshXLow		11	10[2dB] (-106dBm)	Minimum RX level required for a neighboring cell on the frequency to become a candidate for reselection if the priority of the frequency is lower than or equal to that of the serving frequency. Ensure this is > Snonintrasearch and > A2 event (A2ThdRsrp - Hyst) to allow UE has time to search other LTE frequency and avoid Ping Pong handover
QRxLevMin		-64	-64 [2dBm] (-128dBm)	Minimum required RX level for the cell to become a candidate during cell reselection
EUTRANReselTime		1	1 [s]	Time threshold for inter-frequency cell reselection
DlEarfcn		NA	1299 for L1800 2850 for L2600	Define L1800 as L2600 cell reselection Inter-Freq Define L2600 as L1800 cell reselection Inter-Freq
CellReselPriorityCfgInd		NOT_CFG	CFG	If this parameter is not specified or set to NOT_CFG, then UE won't reselect to neighboring cells on the frequency
CellReselPriority		NA	**6 for L2600** **5 for L1800**	L1800 has highest priority followed by L2600, which is higher than UMTS and GSM

Assume: L1800 has higher priority than L2600

2015-Feb-6 : Base on maxis Fahis requirement. For push user from 3G, change : Snonintra search from 9 to 8; Thrshserv low from 7 to 6 .. Change

Pro&Con analysis if set 2.6G higher priority

(Assume L2600 has larger bandwidth)

- Pro:
  - UE will always prefer to stay at 2.6G and initial service to get better experience (especially if L2600 has larger bandwidth then UE may get higher peak throughput)
  - Load may shift to 1.8G if 2.6G load is high
  - For these LTE UE that only support L1800, it will go to L1800, and dual band LTE phone will prioritize to L2600 thus the load between L1800 and L2600 would have a initial balanced load
- Con:
  - In 1.8G coverage area without 2.6G coverage, UE will try to measure 2.6G to cause extra battery consumption

Pro&Con analysis if set 1.8G higher priority

- Pro: (Assume L2600 has larger bandwidth)
  - UE prioritize to stay in 1.8G, which has better coverage than that of 2.6G to reduce battery consumption due to Inter-Frequency reselection
- Con:
  - UE will always initial services from 1.8G cell, which will cause 1.8G cell easy to congestion and user experience may not as good as that in 2.6G
  - For compatible with iPhone 5, UMTS to LTE redirection can only choose L1800 as target layer, this may also cause most of the connect UE fall in L1800 to degrade throughput experience while L2600 is much spare
  - So far only MLB could balance load from 1.8G to 2.6G, but MLB require target Inter-Freq cell load lower than serving cell, thus still most possibility there will be higher load in 1.8G than in 2.6G
- A third candidate solution: set 1.8G and 2.6G with same priority

Pro&Con analysis if set same priority

(Assume L2600 has larger bandwidth)

- Pro:
  - UE no need to search Inter-Freq if stay in frequency center area to cause battery consumption
  - UE almost randomly select to 1.8G and 2.6G, which could help to balance load
- Con:
  - UE still could not always prefer to allocate service on 2.6G

Huawei propose: set 2.6G higher priority

- If 2.6G set higher priority
  a) For USB modem UE, battery consumption is not an issue since it will be plug into USB for charging
  b) For smartphone, the LCD screen and other activities (surf, email, talking, etc) are major cause for battery consumption rather than idle mode cell reselection
  c) iPhone 5 only support L1800 cannot support L2600, and most of other LTE phone support both L1800 and L2600, so iPhone 5 will register to L1800 and other phone register to L2600, this will initial a balanced load between L1800 and L2600

Maxis decide to set 1.8G higher priority

Decided in 06th Mar 2013

- Maxis decided to set L1800 higher priority than L2600
  - To avoid any incompatible issue with LTE UEs that support L1800 but don't support L2600
  - L1800 priority set to 5 and L2600 priority set to 6
  - Inter-Frequency MLB will be the method to balance the load between two layers
- Huawei propose to review and consider if need to change in future when commercial user grows up
- From 08th May, 2013, Huawei and Maxis is doing trial to set L1800 and L12600 has same priority (6) within LTE system, and from 2G/3G to LTE still remain prioritize to L1800
  - No negative result was seen from the trial in cluster 1b and 1c

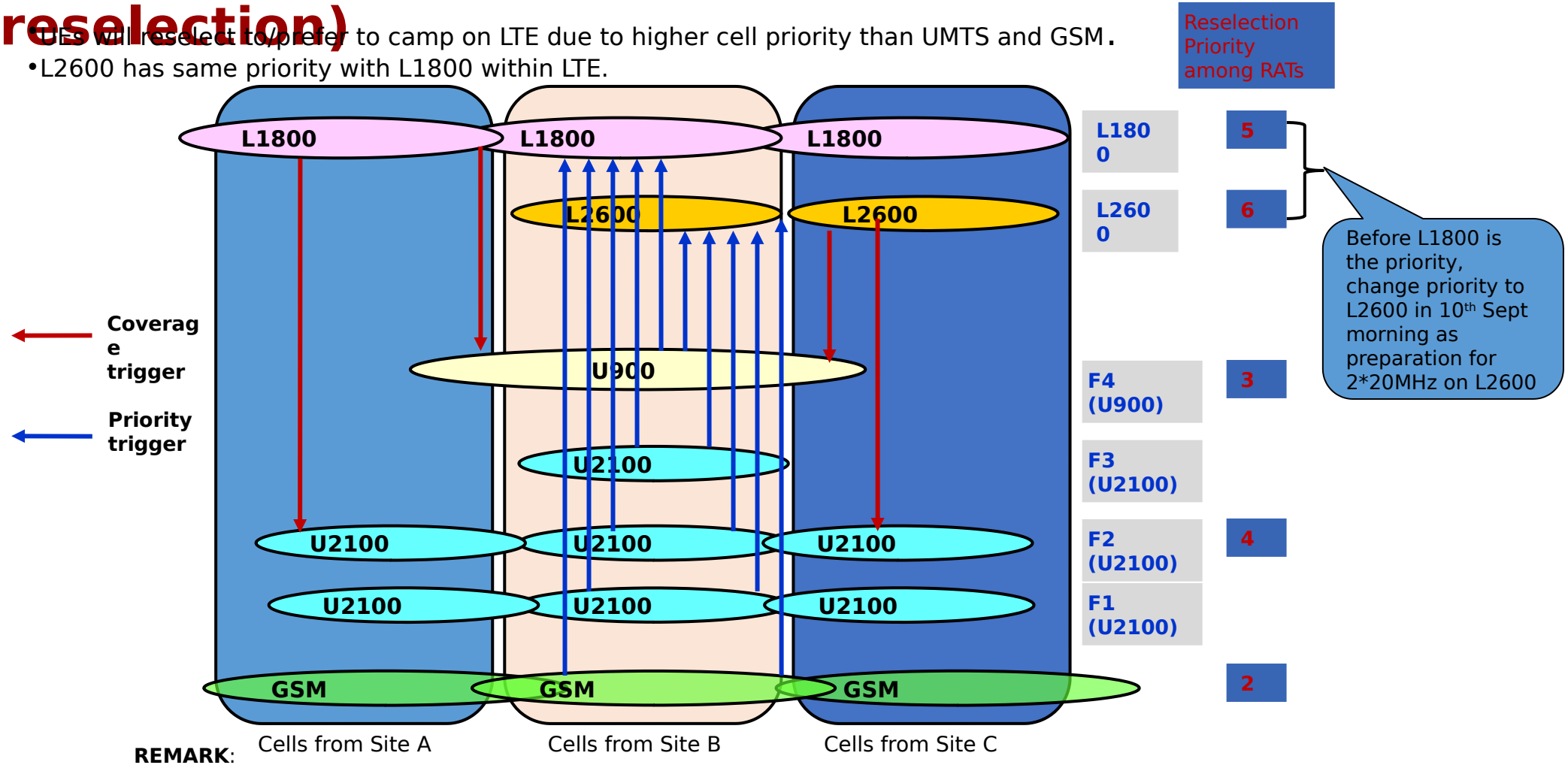
L1800 and L2600 are set same priority based on trial

Implement in 17th Jun 2013

- L1800 and L2600 are set same priority according to trial result
  - Both priority of L1800 and L2600 are set to 6
  - To allow user idling in both layers, to offload L1800 naturally
  - When reselect from 3G/2G to LTE, still remain L1800 has higher priority (6) than L2600 (5)

LTE Mobility – Idle Mode (Inter-RAT reselection)

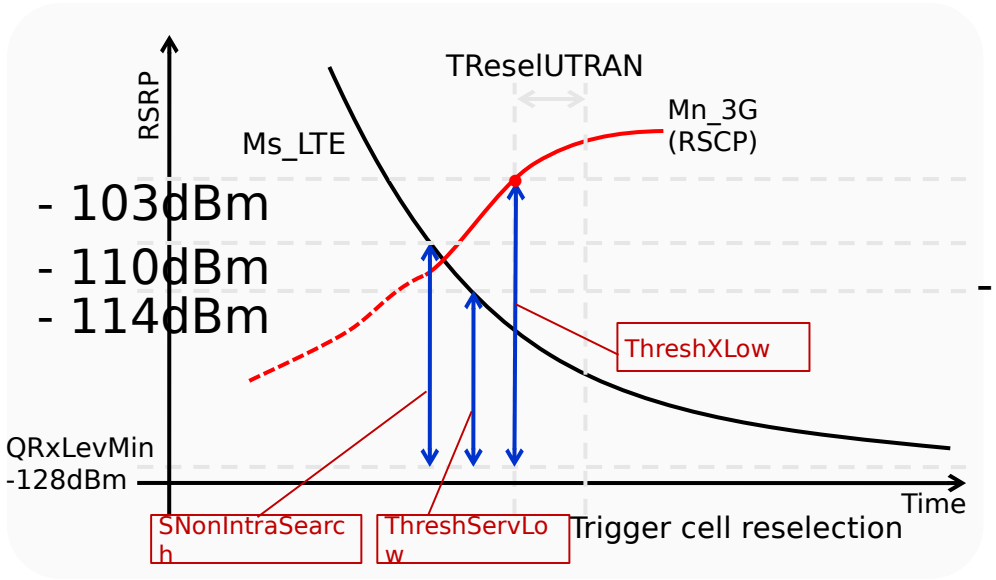
- UEs will reselect to/prefer to camp on LTE due to higher cell priority than UMTS and GSM.
- L2600 has same priority with L1800 within LTE.



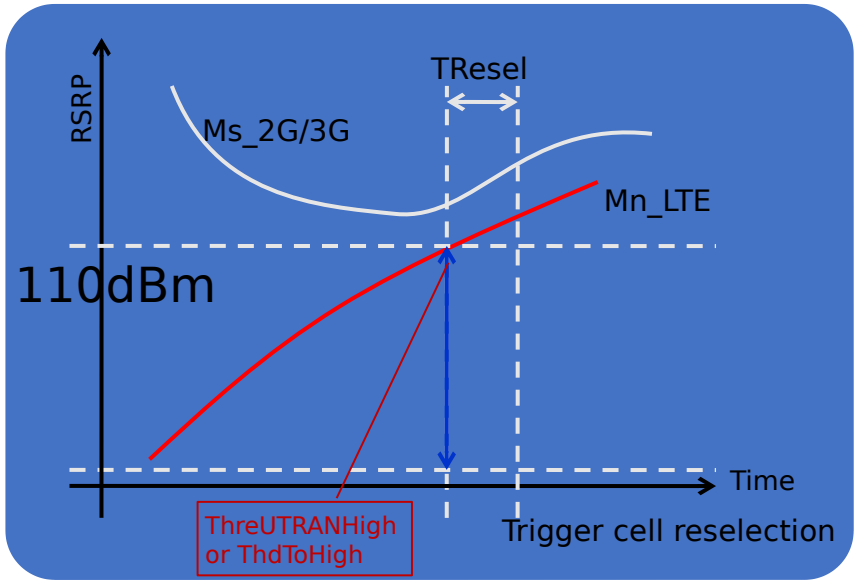
REMARK:

- L->U (F2) reselection will be triggered only when LTE signal is low and UMTS signal fulfill requirement.
- G->L and U->L reselection is based on priority (UE prefer to stay in LTE).
- UE will reselect back to LTE from 3G/2G once LTE signal beyond the threshold.

LTE Mobility – Idle Mode (Inter-RAT)



Only when LTE RSRP < -114dBm and UMTS RSCP > -103dBm during 1 second, then reselect to UMTS



- Once LTE RSRP > -110dBm during 1 second, then reselect to LTE
- If different reselection priority are set for different LTE frequency, then UE will search the prioritize frequency first, if no suitable cell then select second priority frequency.

LTE -> UMTS – Idle reselection

LTE Parameter	MML Command	Default value	Recommended value	Comments
SNonIntraSearchCfgInd	MOD CELLRESEL	CFG	CFG	Enable EUTRAN Inter-Frequency and IRAT measurement
SNonIntraSearch		10	8 [2dB] (-112dBm)	Threshold to measure EUTRAN Inter-Frequency and IRAT. Ensure this is < ThdToHigh and >= ThrshServLow to avoid ping pong and allow UE time to look for EUTRAN Inter-Frequency and UMTS
ThrshServLow		10	6 [2dB] (-116dBm)	threshold used in the evaluation for reselection to a neighboring cell on a lower-priority inter-RAT frequency.
CellReselPriority		7	6 for L1800 5 for L2600	LTE priority is always higher than URAN , and L1800 higher than L2600
QRxLevMin	MOD CELLSEL	-64	-64 [2dBm] (-128dBm)	Indicates the minimum required RX signal level used in the evaluation for cell selection.
CellReselPriorityCfgInd	ADD UTRANNFREQ	NOT_CFG	CFG	Enable cell reselection priority configuration . **If reselection priority is not configured , UE won't reselect to the 3G frequency.**
CellReselPriority		1	3(U900) 4(2100)	U2100 priority is higher than U900 but lower than LTE (prefer to stay in LTE) , UE will prioritize to stay in U2100. When U2100 coverage is poor then UE can try U900. Due to U900 is not co-located with all U2100.
ThreshXLow		6	6 [2dB] (-103dBm)	The RX signal level threshold used in reselection to neighboring cells on a lower-priority UTRAN frequency.
PmaxUTRAN		33	24 [dBm]	The maximum UE power in UTRAN
QRxLevMin		-58	-58 [2dBm] (-115dBm)	Minimum RSCP level to camp on UMTS
UTRANDLARFCN		NA	10662 for U2100 2939 for U900	DL UARFCN of the neighboring cell on the UTRAN frequency
TReselUTRAN	ADD CELLRESELUTRAN	1	1 [s]	Cell reselection duration of UTRAN cell reselection; Enable SIB6 broadcast (if don't set this MML, then L2U reselection won't trigger)

Same as setting in Intra-Freq reselection

2015-Feb-6 :
Base on maxis Fahis requirement. For push user from 3G, change : Snonintrasearch from 9 to 8; Thrshservlow from 7 to 6 .. Change EutranNfre-ThreshXlow from 11 to 10.

- For L->U reselection measurement, only RSCP is defined by 3GPP 36.304in 5.2.4.5 (E-UTRAN inter-frequency and inter-RAT Cell Reselection criteria)

Cell reselection priority in System Information (LTE part)

L3 Messages

Time	TimeStamp	Channel	Direction	Message
03:35:37.064	1030131347586093	DL-DCCH	eNodeB->MS	RRCConnectionRelease
03:36:27.943	1030131398513687	PCCH	eNodeB->MS	Paging
03:36:29.221	1030131399793625	PCCH	eNodeB->MS	Paging
03:36:30.415	1030131400989500	BCCH-DL-SCH	eNodeB->MS	SystemInformationBlockType1
03:36:30.420	1030131400995468	BCCH-BCH	eNodeB->MS	MasterInformationBlock
03:36:30.450	1030131401026375	BCCH-DL-SCH	eNodeB->MS	SystemInformation
03:36:30.568	1030131401146406	BCCH-DL-SCH	eNodeB->MS	SystemInformation
03:36:32.966	1030131403549500	BCCH-DL-SCH	eNodeB->MS	SystemInformationBlockType1
03:36:32.971	1030131403555437	BCCH-BCH	eNodeB->MS	MasterInformationBlock

Message Browser - MsgExplain

```
sib3
  cellReselectionInfoCommon
  cellReselectionServingFreqInfo
    s-NonIntraSearch:0x18 (24)
    threshServingLow:0x18 (24)
    cellReselectionPriority:0x6 (6)
```

LTE serving cell reselection priority in SIB 3

```
systemInformation
criticalExtensions
systemInformation-r8
sib-TypeAndInfo
CHOICE
sib6
carrierFreqListUTRA-FDD
CarrierFreqUTRA-FDD
  carrierFreq:0xb7b (2939)
  cellReselectionPriority:0x4 (3)
  threshX-High:0x6 (6)
  threshX-Low:0x6 (6)
  q-RxLevMin:-0x3a (-58)
  p-MaxUTRA:0x18 (24)
  q-QualMin:-0x16 (-22)
CarrierFreqUTRA-FDD
  carrierFreq:0x29a6 (10662)
  cellReselectionPriority:0x3 (4)
  threshX-High:0x6 (6)
  threshX-Low:0x6 (6)
  q-RxLevMin:-0x3a (-58)
  p-MaxUTRA:0x18 (24)
  q-QualMin:-0x16 (-22)
t-ReselectionUTRA:0x1 (1)
```

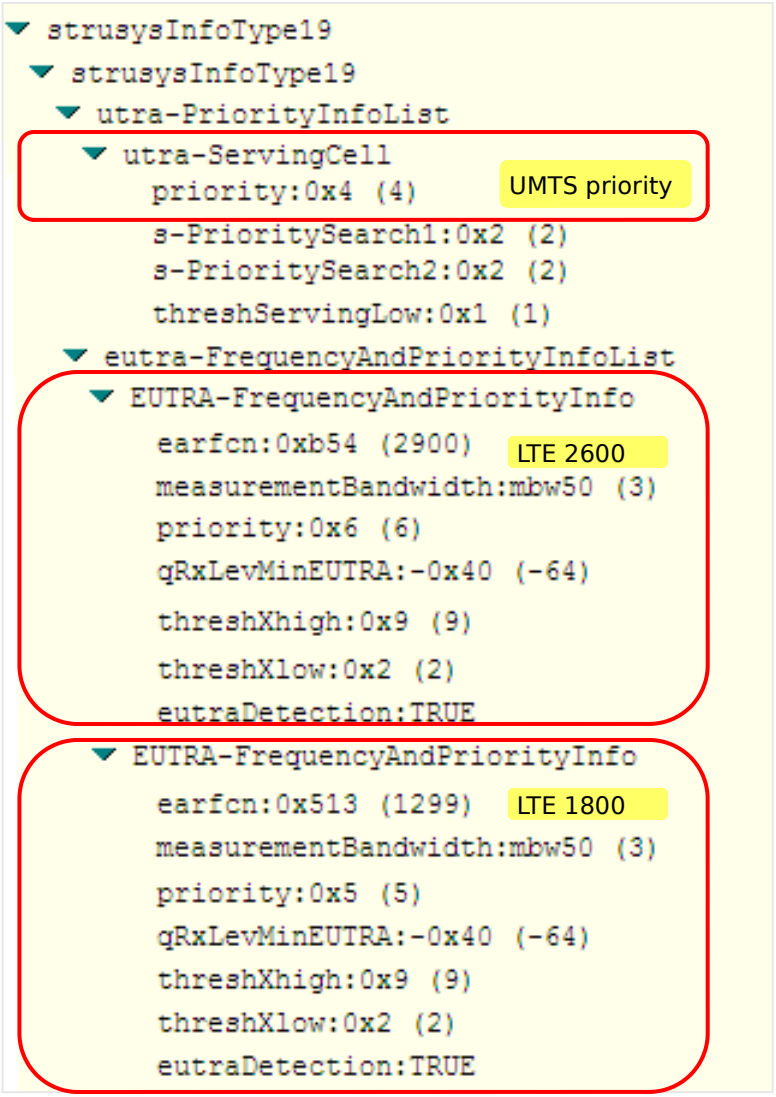
3G neighbor frequencies reselection priority in SIB6

Set U2100 reselection priority higher than U900 but lower than LTE (prefer to stay in LTE) , UE will prioritize to search U2100 if LTE signal is poor. When U2100 coverage is also poor then UE will try U900. Due to U900 is not really continuously cover the city.

Cell reselection priority in 3G SIB 19

Trace T...	Dire...	Message Type
UU Trace	To-UE	RRC_SYS_INFO_TYPE1
UU Trace	To-UE	RRC_SYS_INFO_TYPE2
UU Trace	To-UE	RRC_SYS_INFO_TYPE3
UU Trace	To-UE	RRC_SYS_INFO_TYPE5
UU Trace	To-UE	RRC_SYS_INFO_TYPE11
UU Trace	To-UE	RRC_SYS_INFO_TYPE12
UU Trace	To-UE	RRC_SYS_INFO_TYPE_SB1
UU Trace	To-UE	RRC_SYS_INFO_CHANGE_IND
UU Trace	To-UE	RRC_SYS_INFO_TYPE1
UU Trace	To-UE	RRC_SYS_INFO_TYPE2
UU Trace	To-UE	RRC_SYS_INFO_TYPE3
UU Trace	To-UE	RRC_SYS_INFO_TYPE5
UU Trace	To-UE	RRC_SYS_INFO_TYPE11
UU Trace	To-UE	RRC_SYS_INFO_TYPE12
UU Trace	To-UE	RRC_SYS_INFO_TYPE19
UU Trace	To-UE	RRC_SYS_INFO_TYPE_SB1

Start from 10th Sept 2013, LTE 2600 priority is higher than LTE 1800 for U to L reselection.



UMTS -> LTE – Idle reselection (set at 3G side)

UMTS Parameter	MML Command	Default value	Recommended value	Comments
	SET LICENSE		SETOBJECT=UMTS, ISPRIMARYPLMN=YES, FUNCTIONSWITCH5=UL_MOBILITY_P1-1	Enable License for UMTS to LTE reselection
EARFCN	ADD UCELLNFREQPRIOINFO	NA	1299 for L1800, 2900 for L2600	LTE EARFCN
NPriority		NA	5 for L1800 6 for L2600	LTE cell reselection priority (UMTS:4, GSM: 2) Before 10th Sept 2013: 5 for L2600 and 6 for L1800
EMeasBW		D6	D50	measurement bandwidth information common on the target frequency
ThdToHigh		2	9 [2dB] (-110dBm)	Ensure this is > Snonintrasearch and > A2 Event (A2ThdRsrp - Hyst) to avoid ping pong reselection or handover to 3G right after connected
Eqrxlevmin		-70	-64 [2dBm] (-128dBm)	Minimum RSRP level to camp on LTE
SPriority	MOD UCELLSELRESEL	4	4	UMTS cell priority lower than LTE (UE will always search LTE) . To set both U900 and U2100 has same priority in UMTS side then it won't affect UMTS cell reselection.
SibCfgBitMap	ADD UCELLSIBSWITCH	NA	SIB19-1	Enable SIB 19 for UMTS to LTE reselection

For 3G to LTE reselection, no need to define 3G to LTE neighbor relationship, only LTE frequency, bandwidth and priority parameters are required for each UMTS cell.

U to L reselection if multiple higher LTE layers configured

- From 3GPP 25304, UE shall measure all inter-RAT layers with higher priority than serving cell, and reselect to the higher Srxlev cell on the highest priority layer.
- Based on this, if more than one LTE higher priority layers are set in 3G for U to L reselection, UE shall measure all LTE layers regardless they are same or different priority, and reselect to the highest layer with higher RSRP.
  - If UE doesn’t support L26, then it will measure L1800 only then reselect to L18.
  - If UE support both L1800 and L2600, UE shall measure both layer.

3GPP 25304 5.2.6.1.2a:

- If the UE has received absolute priority information for inter-RAT layers, the UE shall follow these rules:
- - The UE shall perform measurements of inter-RAT layers with a priority higher than the priority of the current serving cell.

3GPP 25304 5.2.6.1.4a:

The following definitions apply:

- Criterion 1: the SrxlevnonServingCell,x of a cell on an evaluated higher absolute priority layer is greater than Threshx,high during a time interval Treselection;

  (Remark: Criterion 2 and 3 in same session define reselection creteria to layer with same or lower priority)
- Cell reselection to a cell on a higher absolute priority layer than the camped frequency shall be performed if criterion 1 is fulfilled.
- If more than one cell meets the above criteria, the UE shall reselect the cell with the highest SrxlevnonServingCell,x among the cells meeting the criteria on the highest absolute priority layer.

GSM -> LTE – Idle reselection (set at GSM

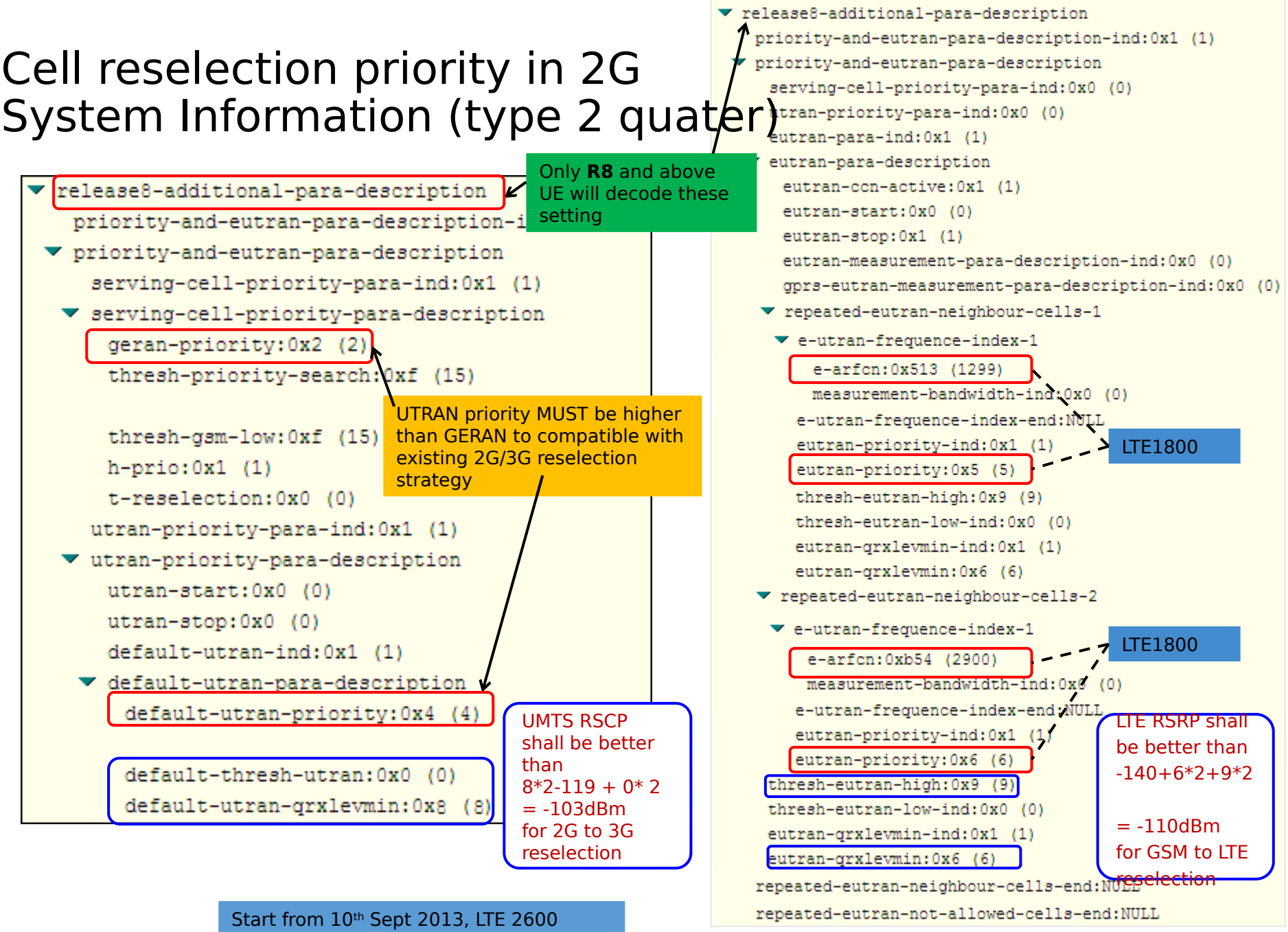
GSM Parameter	MML Command	Default value	Recommended value	Comments
GERANPri	SET GCELLPRIEUTRANSYS (All GERAN carriers)	7	2	Set LTE highest priority then 3G and GSM the lowest priority.
UTRANPri		1	4	
EUTRANPri		0	6	THRUTRANHIGH and UTRANQRXLEVMIN determine the threshold for UE reselect from 2G to 3G is: -103dBm +0dB = -103dBm, matching to existing 2G/3G reselection setting (-102dBm)
THRUTRANHIGH		20	0 (0*2dB=0dB)	
THRUTRANLOW		20	0 (0*2dB=0dB)	R7 and older UE won't decode parameters in this command, and will follow existing 2G/3G reselection setting.
UTRANQRXLEVMIN		9	8 (8*2-119 = -103dBm)	For R8 and above UE, 2G/3G priority and threshold in this command will overwrite the existing 2G/3G reselection setting. So we must set UTRAN priority higher than GSM, to ensure R8 and above UE can reselect to UMTS as priority.
ThrEUTRANHigh		9	9 [2dB] (-110dBm)	RSRP threshold for reselect to LTE from 2G. Ensure higher than Snonintrasearch and A2 Event to avoid ping pong reselection (-128+9*2=-110dBm)
THRPRISEARCH		NA	15	Enable UE always search UMTS or LTE in idle mode
THREUTRANLOW		9	9 [2dB] (-110dBm)	
EUTRANQRXLevMin		6	6 [2dB] (-128dBm)	Minimum RSRP level to camp on LTE (-140+2*6=-128)
THRGSMLOW		0	15	Always search 3G or LTE signal when UE in GSM
QPEUTRAN		15	7	UE always search LTE signal when UE has PDP in GSM
HPRIO		0	1 (5dB)	0 (∞), 1(5dB), 2 (4dB), 3 (3dB). Refer to 3GPP 45008 6.6.6 Algorithm for inter-RAT cell re-selection based on priority information

GSM -> LTE – Idle reselection (set at GSM side)

GSM Parameter	MML Command	Default value	Recommended value	Comments
EXTLTECELLID	ADD GEXTLTECELL Dummy LTE cell can be defined, only EARFCN and Duplexer mode(FDD or TDD) will broadcast to UE in SIB 2 quater	NA	8048 and above	Index of a LTE external cell, shall be unique within a 2G BSC
FREQ		NA	1299 for L1800, 2900 for L2600	LTE EARFCN
EUTRANTYPE		NA	FDD	Indicate the LTE cell is TDD or FDD
SptResel	ADD GLTENCELL (All GERAN carriers)	NA	SUPPORT	Enable cell reselection to LTE cell.
NCELLPRI		255	6 for L2600 5 for L1800	Define different reselection priority for different LTE frequency Before 10th Sept 2013: 5 for L2600 and 6 for L1800
LTECellReselEN	SET GCELLHOBASIC	No	Yes	To enable reselection from GSM to LTE

For GSM to LTE reselection, need to define at least one LTE neighbor for each LTE frequency for each GSM cell.
Two dummy neighbors for L1800 and L2600 are introduced to realize the GSM to LTE reselection in Maxis network.

Cell reselection priority in 2G System Information (type 2 quater)



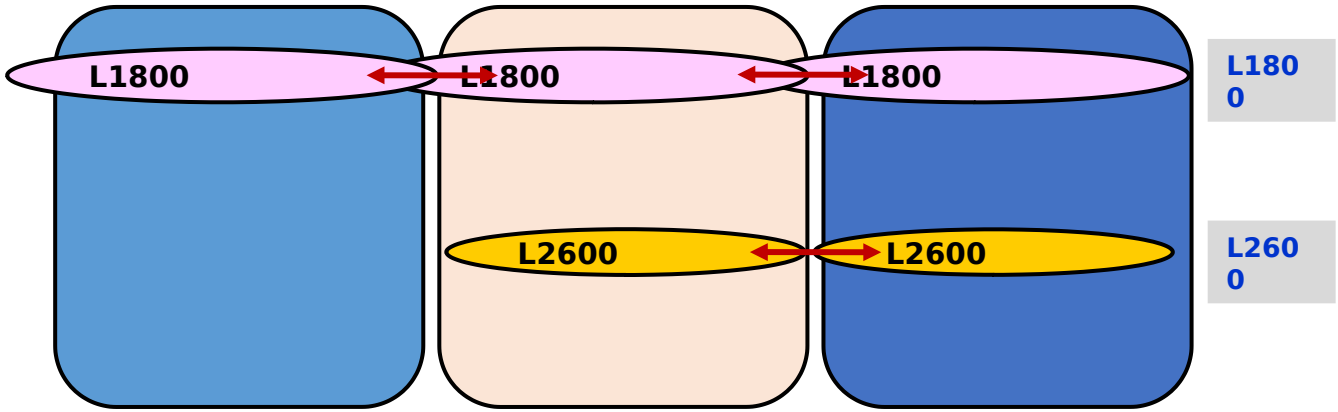
Start from 10th Sept 2013, LTE 2600 priority is higher than LTE 1800 for G/U to L reselection.

Effect if enable 2G to LTE reselection

- Reselection to 3G will be longer for LTE compatible UE if LTE signal is not good enough
  - 2 new SIB 2quater are introduced for 2G to LTE reselection, and each SIB will take 3~4 S for UE to receive. Only after UE receives all SIB 2quater the UE will start Inter-RAT measurement if 2G is the lowest layer. Thus 2G to 3G reselection will prolong 6~8S more, compare to that if 2G to LTE reselection not introduced.
- Normal 2G to UMTS reselection will be replaced by the “priority reselection”
  - Need to set UMTS priority higher than 2G and lower than LTE to compatible with existing “normal” 2G to 3G reselection criteria
  - From 3GPP 45008, *6.6.6 Algorithm for inter-RAT cell re-selection based on priority information*:
    ……. (describe the priority based Inter-RAT reselection from 2G to 3G or LTE)
    A UTRAN FDD cell shall only be reselected if, in addition to the criteria above, its measured Ec/No value is equal to or greater than *FDD_Qmin - FDD_Qmin_Offset.*
    So from above, we can see UE will evaluate both RSCP and Ec/Io before reselect to 3G.

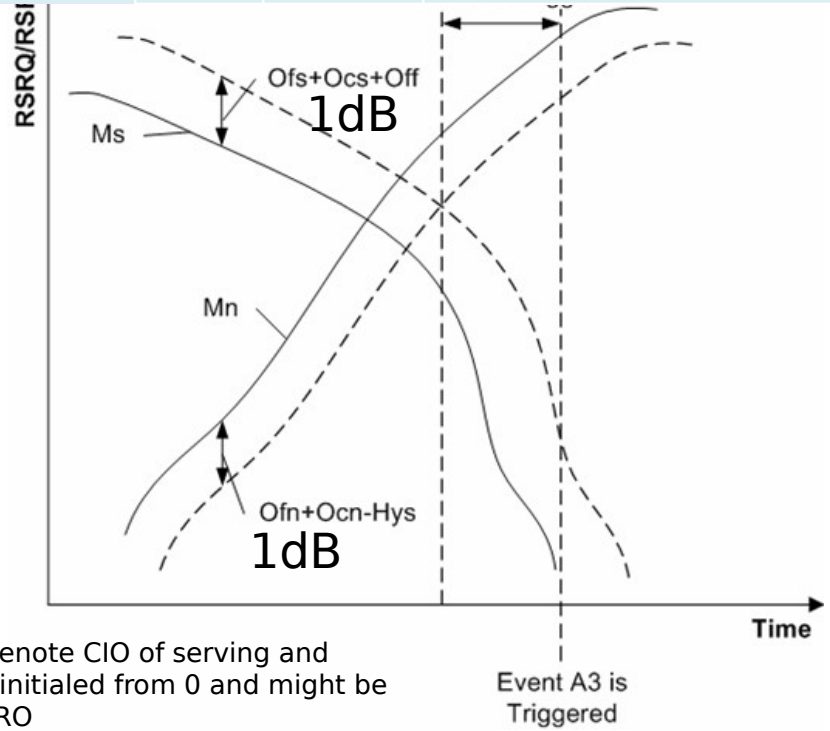
LTE <-> LTE (Intra-Freq Handover)

- Intra-Freq HO will occur if UE moves within LTE same frequency coverage area triggered by A3 event



LTE <-> LTE (Intra-Freq Handover)

LTE Parameter	MML Command	Default value	Recommended value	Comments
IntraFreqHoA3Hyst	MOD INTRAFREQHOGROUP	2	2[0.5dB] (1dB)	Intrafreq handover hysteresis for event A3
IntraFreqHoA3Offset		2	2[0.5dB] (1dB)	Intrafreq handover offset for event A3
IntraFreqHoA3TimeToTrig		320	320ms	Intrafreq handover time to trigger
IntraFreqHoA3TrigQuan	MOD INTRARATHOCOMM	RSRP	RSRP	The quantity used to evaluate the triggering condition for the Intra-Frequency handover event.
IntraFreqHoA3RprtQuan		RSRP	RSRP	The quantity to be included in the measurement report for the Intra-Frequency handover event.



Event A3: Neighbour becomes offset better than serving.

A3-1 (Entering condition):

$$Mn + Ofn + Ocn - Hys > Ms + Ofs + Ocs + Off$$

A3-2 (Leaving condition):

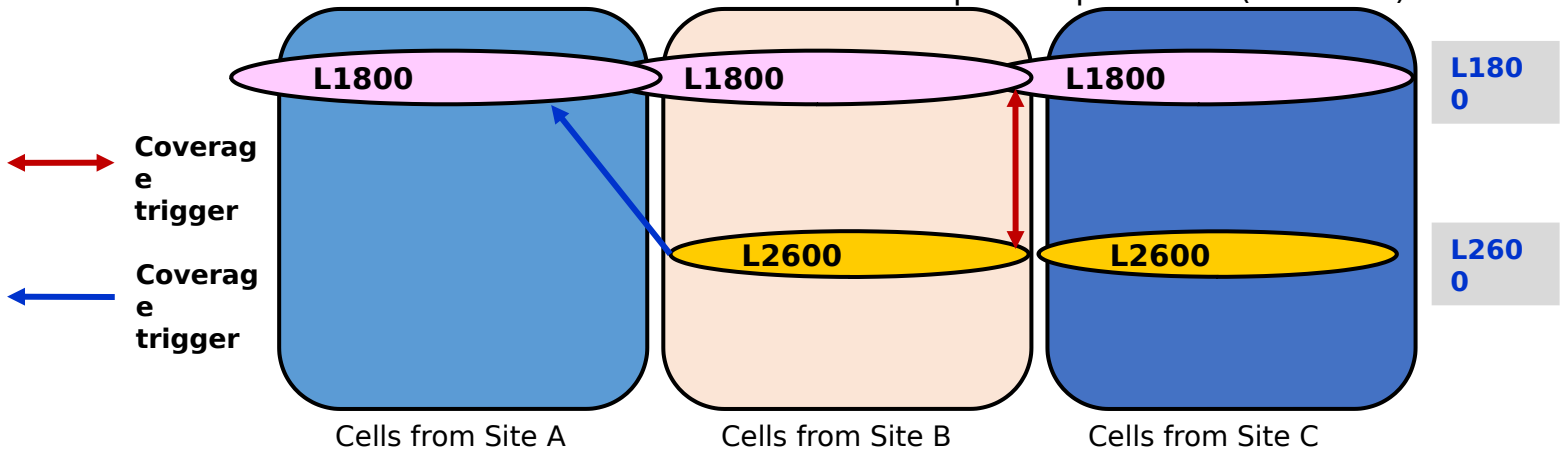
$$Mn + Ofn + Ocn + Hys < Ms + Ofs + Ocs + Off$$

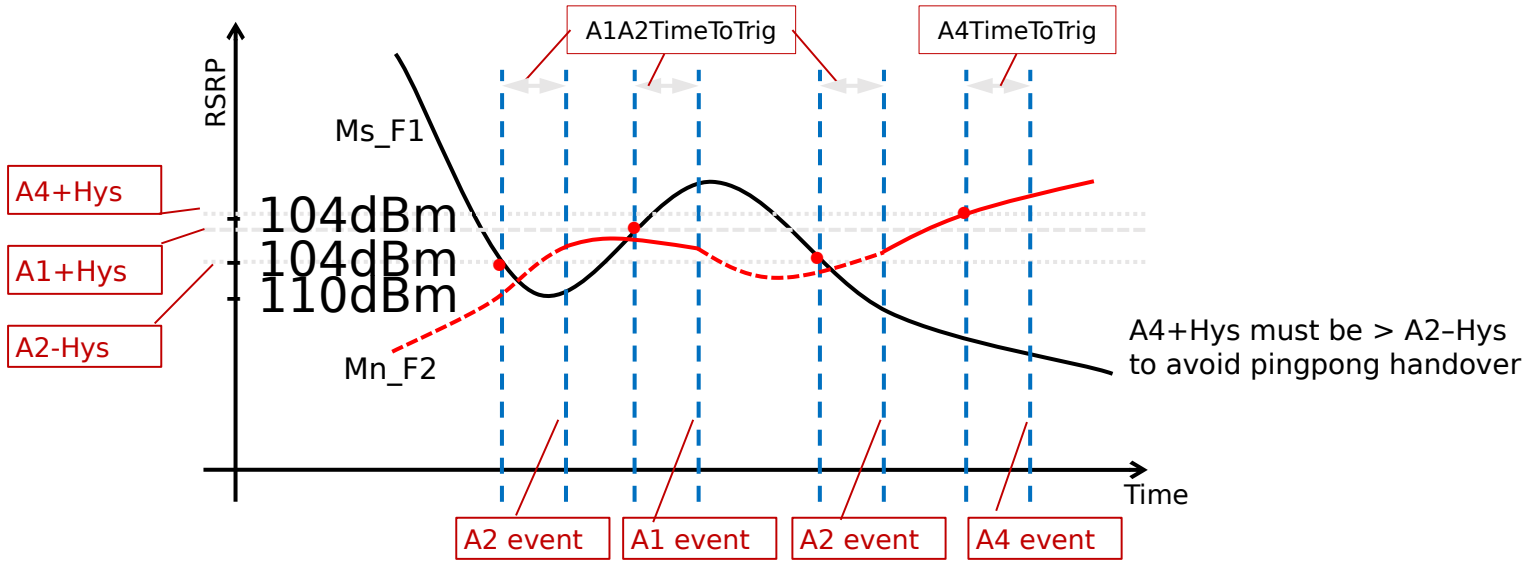
Mn :neighboring cell measurement result;
Ofn : frequency-specific offset for the frequency of the neighboring cell. It is specified by the ***QoffsetFreq*** parameter.
Ocn : cell-specific offset (CIO) for the neighboring cell. It is specified by the ***CellIndividualOffset*** parameter. If eNodeB does not deliver this parameter. UE uses the default value 0.
Ms : serving cell measurement result.
Ofs : frequency-specific offset for the serving frequency. It is specified by the ***QoffsetFreq*** parameter. This variable is contained in the associated measurement object IE in the measurement configuration.
Ocs : cell-specific offset for the serving cell. It is specified by the ***CellSpecificOffset*** parameter.
Hys :hysteresis for event A3. It is specified by the ***IntraFreqHoA3Hyst*** parameter and contained in the delivered measurement configuration.
Off :offset for event A3. It is specified by the ***IntraFreqHoA3Offset*** parameter. This A3-specific parameter is used to adjust the probability of triggering handovers.

- Ocs and Ocn denote CIO of serving and neighbor cells initialed from 0 and might be modified by MRO
- Ofn and Ofs are frequency offset which is 0 by default

LTE <-> LTE (Inter-Freq Handover – Coverage Based)

- Inter-Frequency HO will be triggered when UE moves out of the serving frequency coverage area
- UE will HO to the best cell that fulfill the Inter-Freq HO requirement (A4 event)

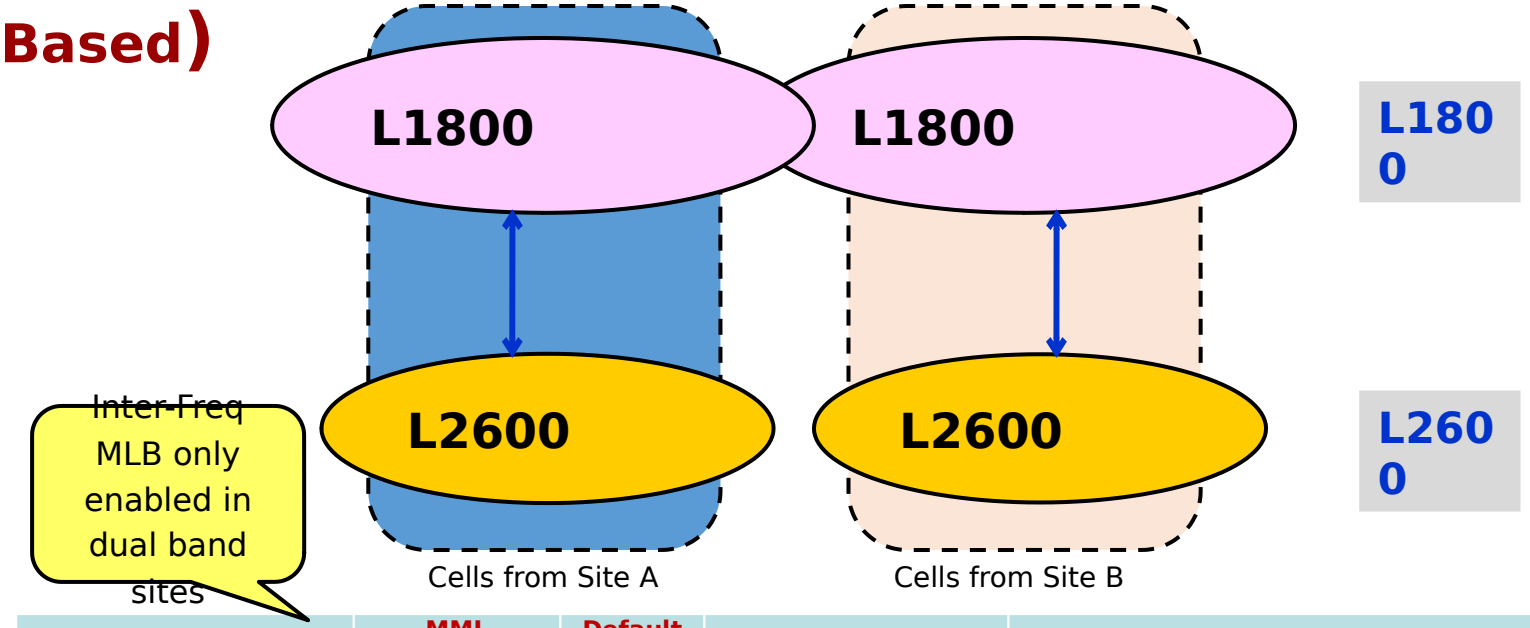




LTE <-> LTE (Inter-Freq Handover – Coverage Based)

LTE Parameter	MML Command	Default value	Recommended value	Comments
InterFreqHoA1A2Hyst	MOD INTERFREQHOGROUP	4	2[0.5dB] (1dB)	Hysteresis for event A1/A2
InterFreqHoA1A2TimeToTrig		640ms	640ms	Interfreq A1A2 time to trigger
InterFreqHoA1ThdRSRP		-105	-105dBm	RSRP threshold for Inter-Frequency measurement event A1. The actual threshold of quitting GAP measurement for Inter-Frequency handover is >-104dBm (-105dBm+1dB)
InterFreqHoA2ThdRsrp		-109	-109dBm	RSRP threshold for Inter-Frequency measurement event A2. The actual threshold of starting GAP measurement for Inter-Frequency handover is < -110dBm (-109dBm-1dB)
InterFreqHoA4ThdRsrp		-105	-105dBm	RSRP threshold for event A4 related to coverage-based Inter-Frequency handover. The actual threshold of starting Inter-Frequency handover is > -104dBm (-105dBm+1dB).
InterFreqHoA4Hyst		4	2[0.5dB] (1dB)	Hysteresis for event A4
InterFreqHoA4TimeToTrig		640ms	640ms	Interfreq A4 time to trigger
InterFreqHoA1A2TrigQuan	MOD INTRARATHOCOMM	RSRP	RSRP	quantity used in the evaluation for Inter-Frequency measurement event A1 or A2.
InterFreqHoA4TrigQuan		RSRP	RSRP	RSRP is suggested to be used to trigger measurement and handover for A4
InterFreqCoverHoSwitch	MOD CELLALGOSWITCH	InterFreqCoverHoSwitch-1	InterFreqCoverHoSwitch-1	To enable Inter-Freq coverage based handover

LTE <-> LTE (Inter-Freq Handover – Load Based)



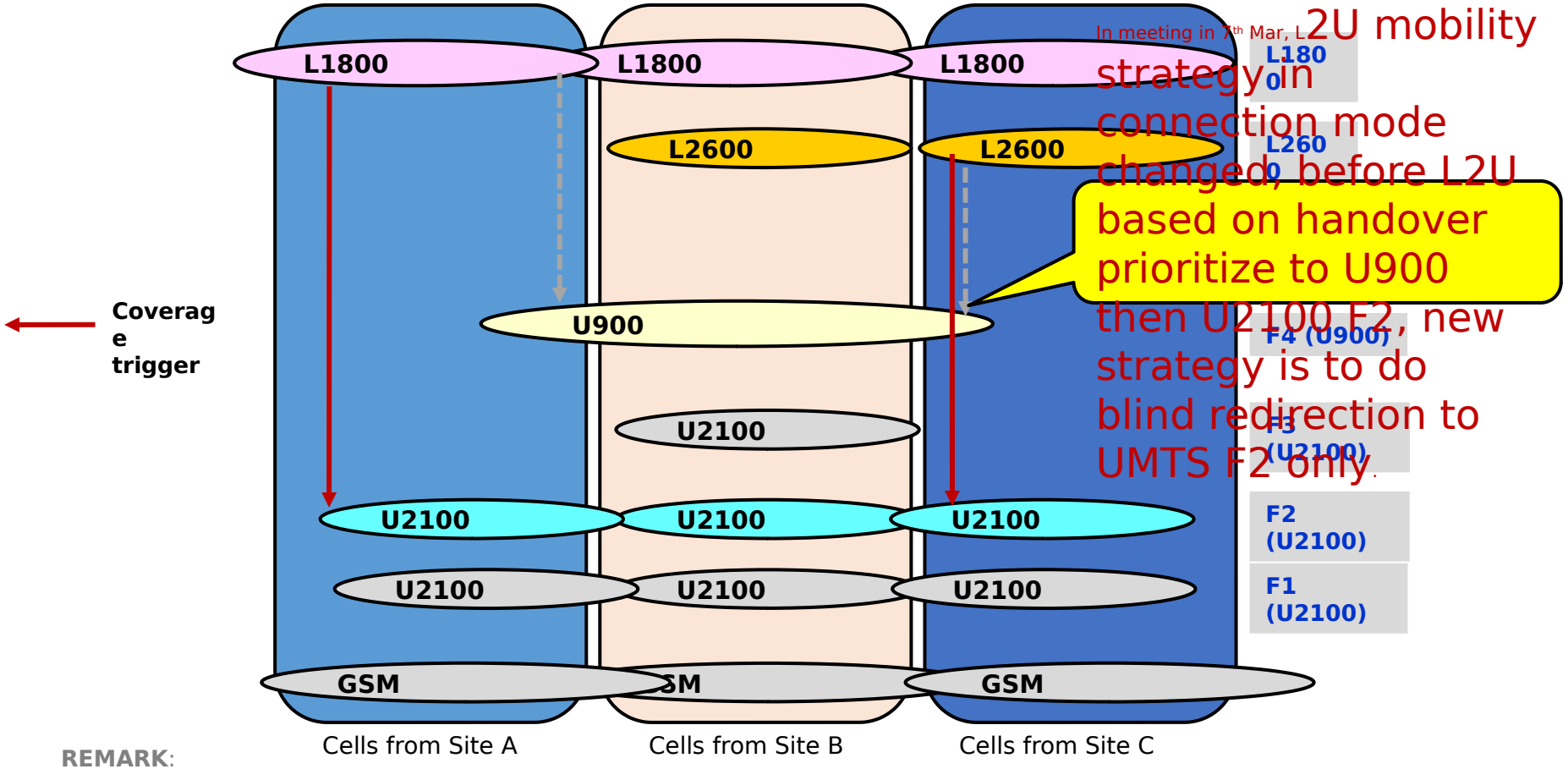
LTE Parameter	MML Command	Default value	Recommended value	Comments
MlbAlgoSwitch	MOD CELLALGOSWITCH	InterFreqMlbSwitch-0	InterFreqMlbSwitch-1	To enable Inter-Freq load balance (MLB). Intra-Freq load balance is not recommended due to Intra-Freq interference.
InterFreqMlbThd	MOD CELLMLB	60	60 (for L1800) 87 (for L2600)	InterFreqMlbThd + LoadOffset < 100 shall be followed
LoadOffset		8	8	Only when cell load > InterFreqMlbThd + LoadOffset then start MLB
LoadDiffThd		15	5 for the L1800 20 for the L2600	Objective to keep more user to L2600. So the L2600 diffethd=20. Only load difference between serving and target cell larger than this threshold then trigger the load sharing HO
InterFreqLoadBasedHoA4ThdRsrp	MOD INTERFREQHOGROUP	-103	-105dBm	RSRP threshold for event A4 related to load-based Inter-Frequency handover The actual threshold of starting load-based Inter-Frequency handover is > -104dBm (-105dBm+1dB)

LTE <-> LTE (Inter-Freq Handover – Load Based)

- eNodeB will evaluate the cell load every second. If load is keeping higher than (*InterFreqMlbThd* + *LoadOffset*) in 5 second period, then
  - If exist Inter-Freq neighbor within the same eNodeB then MLB will be triggered within the same eNodeB;
  - otherwise, eNodeB will communicate with neighbor eNodeBs (with HO SSR>=98%) through X2 interface in the next 30S then makes the decision and execution from the subsequent 30S time period;
  - eNodeB will do the decision and execution every 30S and continue the load communication if load is higher than the threshold defined by *InterFreqMlbThd*
- MLB decision: exist Inter-Freq neighbor cell with load lower to serving cell by *LoadDiffThd*.
- MLB execution:
  - eNodeB will choose UEs that support the Inter-Freq HO to measure the Inter-Freq cell
  - 5 UEs per batch with minimum RB assumption will be chosen
  - Once A4 event reported to eNodeB, MLB HO will be triggered

LTE -> UMTS (Inter-RAT Handover – Coverage Based)

- UE will reselect to/prefer to camp on LTE due to higher cell priority than UTRAN.
- L2600 has same or higher priority than L1800.

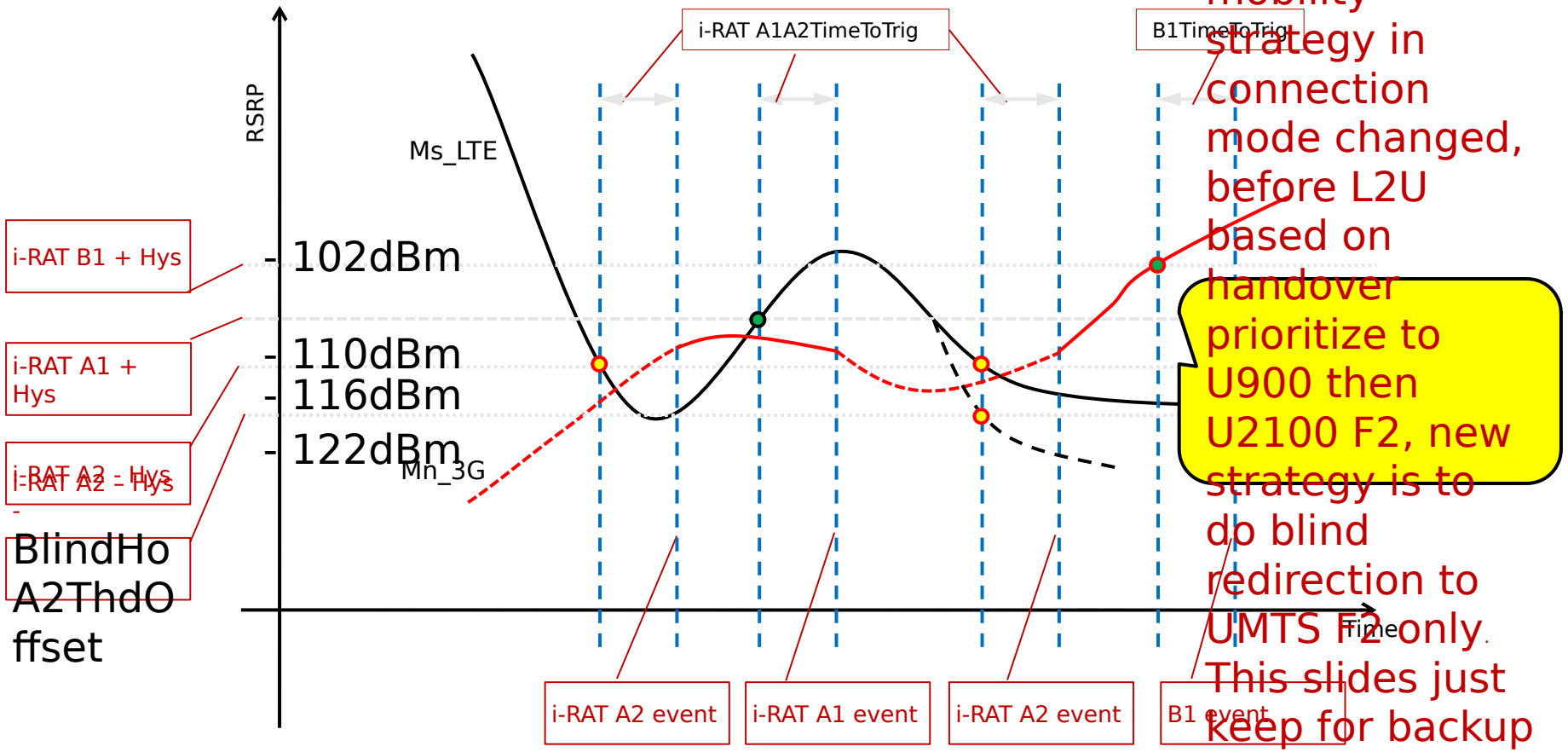


In meeting in 7th Mar, L2U mobility strategy in connection mode changed, before L2U based on handover prioritize to U900 then U2100 F2, new strategy is to do blind redirection to UMTS F2 only.

REMARK:

- L->U (F2) handover will be triggered only when LTE signal is low and UMTS signal fulfill requirement.
- U900 will be the priority target for L->U HO/CSFB and U2100 F2 will be the second candidate redirection target if U900 exist.
- If U900 is configured as first priority of i-RAT HO target, then configure only 1 U2100 neighbor for redirection if U900 not exist

LTE -> UMTS (Inter-RAT Handover – Coverage Based)



In meeting in 7th Mar, L2U mobility strategy in connection mode changed, before L2U based on handover prioritize to U900 then U2100 F2, new strategy is to do blind redirection to UMTS F2 only. This slides just keep for backup if needed in future.

REMARK:

- The trigger mechanism of L->U (F2) handover triggering is similar to that of Inter-Freq HO, only the threshold are for Inter-RAT
- i-RAT B1+Hys > i-RAT 2D event trigger HO from UMTS to GSM to avoid immediate following HO from UMTS to GSM
- If eNodeB receive an A2 event with LTE RSRP < InterRAT A2 Threshold – InterRatHoA1A2Hyst - BlindHoA2ThdOffset, blind redirection to UMTS will be triggered to the UMTS frequency with a blind HO priority

LTE -> UMTS – PS Connected Mode (1/2

LTE Parameter	MML Command	Default value	Recommended value	Comments
HoModeSwitch	MOD ENODEBALGOSWITCH	UTRANRedirectSwitch-0	UTRANRedirectSwitch-1	Enable Redirection to UTRAN switch
		UTRANPsHoSwitch-0	UTRANPsHoSwitch-0	Set to 0 to disable PS handover to UTRAN means to enable blind redirection to UMTS. If set to 1, then enable PS handover to UMTS based on measurement.
InterRatHoA1A2TrigQuan	MOD INTERRATHOCOMM	RSRP	RSRP	RSRP is recommended for LTE measurement.
InterRatHoUTRANB1MeasQuan		UTRAN_RSCP	UTRAN_RSCP	RSCP is recommended to evaluate UMTS signal due to R10 UE is required for EcN0 measurement.
InterRatHoA1ThdRsrp	ADD INTERRATHOCOMMGROUP	-111	-111 dBm	RSRP threshold for inter-RAT measurement event A1. The actual threshold of quitting GAP measurement for inter-RAT handover is >-110dBm (-111dBm+1dB)
InterRatHoA2ThdRsrp		-115	-115 dBm	Ensure (A2ThdRsrp - Hyst) < ThrshServLow to avoid immediate HO to UMTS after UE connected in LTE network The actual threshold to start GAP measurement for inter-RAT handover is < -116dBm (-115dBm-1dB).
InterRatHoA1A2Hyst		2	2 [0.5dB] (1 dB)	Hysteresis for event A1/A2
BlindHoA1A2ThdRsrp	Mod CELLHOPARACFG	-115	-115	Indicates blind redirection trigger threshold. The actual threshold to start the blind handover is <-116dbm(-115dbm-1dB)
InterRatHoUTRANB1ThdRscp	ADD INTERRATHOUTRANGROUP	-103	-103 dBm	RSCP threshold for event B1 used in HO to UTRAN The actual threshold of starting for inter-RAT handover is <-102dBm (-103dBm+1dB)
InterRatHoUTRANB1TimeToTrig		640	640ms	Time-to-trigger for event B1
InterRatHoUTRANB1Hyst		2	2 [0.5dB] (1 dB)	Hysteresis for event B1

BlindHoA2ThdOffset set to 0, then eNodeB will trigger blind redirection immediately once receive an Inter-RAT A2 event.

based on handover prioritize to U900 then U2100 F2, new strategy is to do blind redirection to UMTS F2 only.

Grey color only needed if LTE to UMTS handover is adopted.

Updata at 20-Nov-2014. Due to Eranb6.0 use this parameter to replace "BlindHoA2ThdOffset"

LTE -> UMTS – PS Connected Mode (2/2)

LTE Parameter	MML Command	Default value	Recommended value	Comments
UtranCellId	ADD UTRANEXTERNALCELL	NA	3G Cell ID	Eran 6.0 already separate the RNC ID and RNC cell ID. It different with 3G Indicates the ID of the external UTRAN cell. It uniquely identifies a UTRAN cell within a PLMN. The 28-bit ID of the external UTRAN cell consists of a 12-bit RNC ID (indicated by RNCId) and a 16-bit RNC cell ID (indicated by RNC Cell Id). The formula to calculate the UtranCellID of the external UTRAN cell is as: External UtranCellID = RNC ID x 65536 + RNC cell ID Huawei already plan to separate the 3G RNC ID and 3G Cell ID to 2 defferent parameters in future eRAN version. So far since all 3G cell ID is unique in Maxis 3G network, so it's proposes to just configure 3G Cell ID for this parameter
UtranFddTddType		UTRAN_FDD	UTRAN_FDD	Indicates the type of the UTRAN cell (FDD or TDD)
RncId		NA	NA	RNC ID of the external UTRAN cell
RacCfgInd		NOT_CFG	CFG	whether to set the routing area code (RAC) of the external UTRAN cell. This parameter must be set to CFG if the external UTRAN cell supports packet switched (PS) services
Rac		NA	NA	RAC of the UMTS cell
PScrambCode		NA	NA	Downlink Primary Scrambling Code of the external UTRAN cell
Lac		NA	NA	Location Area Code of the external UTRAN cell
CellName		NA	NA	The external UTRAN cell name.
[illegible]	ADD	[illegible]	16 (1~32) for the co-coverage	Configure one UTRAN (U2100 F2) cell as blind handover neighboring

* For the UE that doesn't support UTRAN measurement, blind redirection would be use, so it's recommended to configure one blind HO cell for the UTRAN frequency having best coverage.

In meeting in 7th Mar 2013, L2U mobility strategy in connection mode changed: before L2U based on handover prioritize to U900 then U2100 F2, new strategy is to do blind redirection to UMTS F2 only. So **only one dummy neighbor is needed**.

LTE -> UMTS (Inter-RAT by blind redirection)

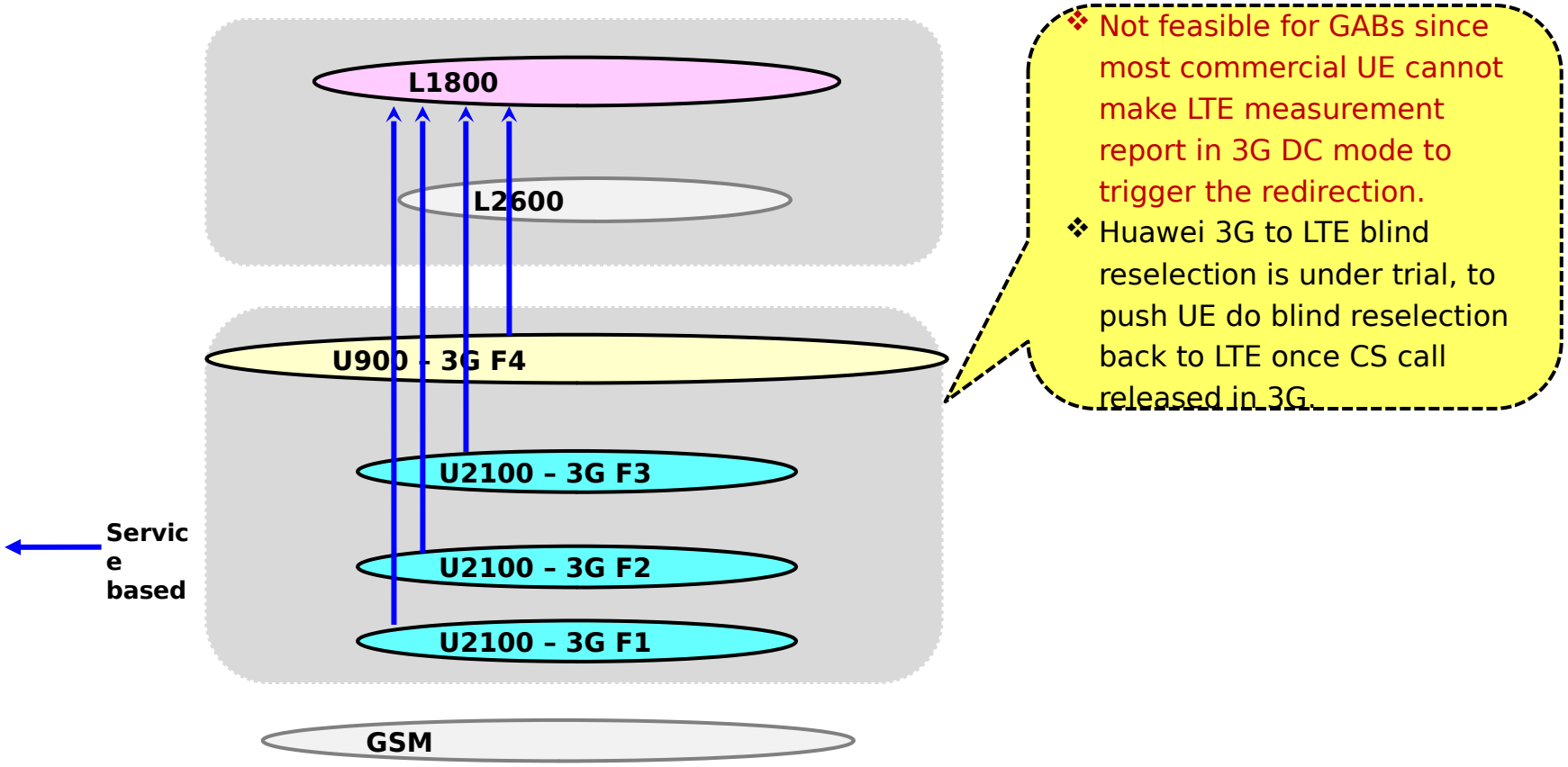
❖ **Coverage based LTE to UMTS redirection (triggered when LTE signal is poor):**
Once RSRP drop below the threshold when UE move out of LTE coverage area, eNodeB will send RRC release message to UE with a UMTS frequency to instruct UE leave LTE to continue service in 3G.

❖ **Service based LTE to UMTS blind redirection (CSFB):**
Before VoIP in LTE introduced, no CS service could be support by LTE, so fallback to 3G is necessary for voice call.
Once UE initial CS Service Request to LTE network and eNodeB receive CSFB indicator from MME, eNodeB will send RRC release message with a UMTS frequency to redirect the UE to 3G, then UE will search a suitable 3G cell to initial the CS call.

➢ A dummy UMTS neighbor with UMTS F2 will be configured with blind handover priority, to indicate the UMTS target frequency for UE to access after UE leave LTE. Whether UE will succeed access in 3G rely quality of 3G.

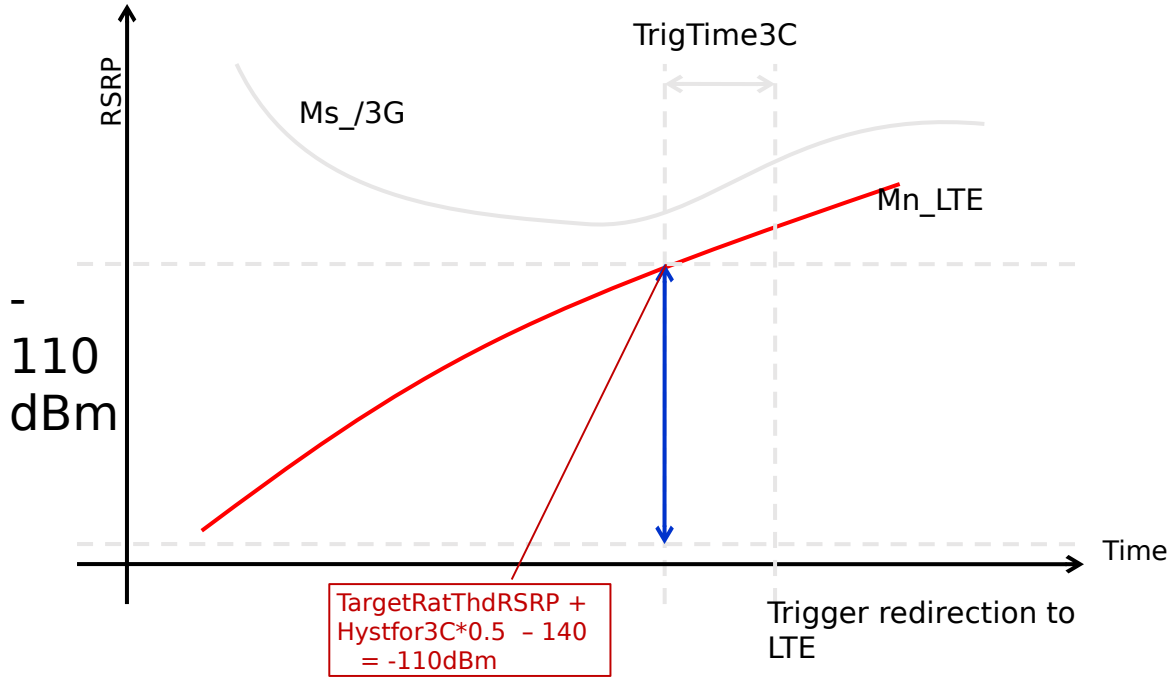
UMTS -> LTE redirection (Service Based)

- To ensure LTE user could goes back to LTE after CSFB to 3G, Service based U2L redirection is introduced


L1800
L2600
U900 – 3G F4
U2100 – 3G F3
U2100 – 3G F2
U2100 – 3G F1
GSM
Service based
Not feasible for GABs since most commercial UE cannot make LTE measurement report in 3G DC mode to trigger the redirection.
Huawei 3G to LTE blind reselection is under trial, to push UE do blind reselection back to LTE once CS call released in 3G.

REMARK:
All UMTS cells need to configure all surrounding LTE cells as neighbor for UMTS to LTE redirection
Only redirect to L1800 since L1800 has better coverage than L2600 and to be compatible with the LTE USs that only support L1800

UMTS -> LTE redirection (Service Based)

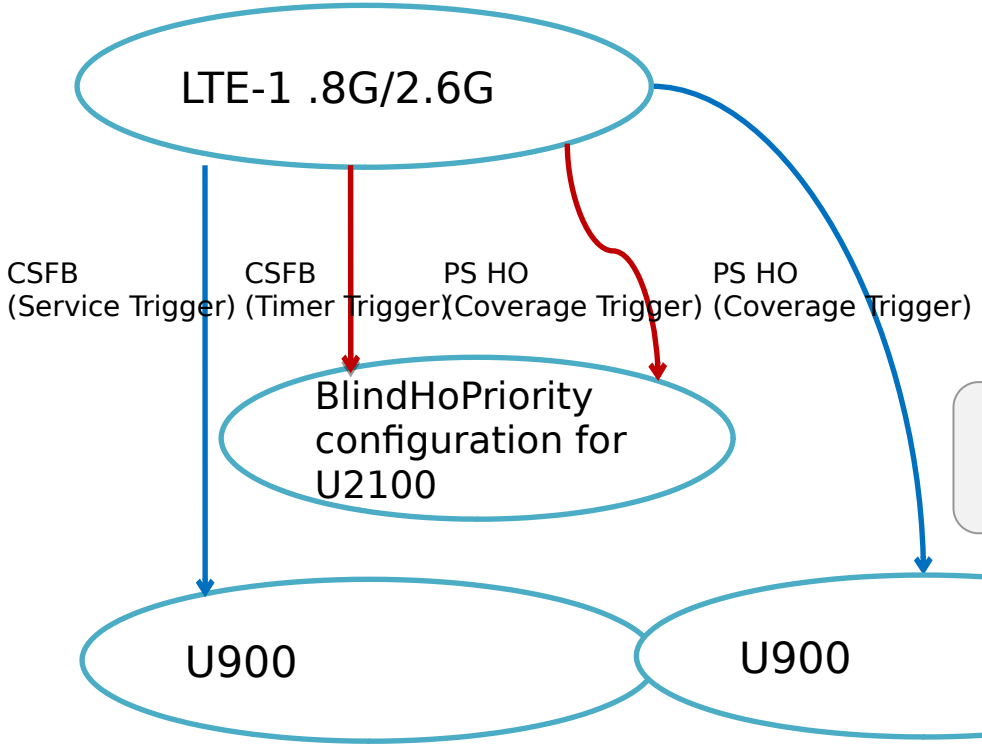


1) When a LTE capable UE release CS call and remain PS connection only, or UE active data services in 3G without CS service, RNC will send measurement control message to UE to measure LTE signal. So UE no chance to enter FACH mode before redirect to LTE.
2) Once UE report LTE RSRP > -110dBm, 3G RNC will redirect the UE from 3G to LTE
3) Due to the phone chipset limitation, UE don't support to measure LTE signal in 3G FACH mode. UE will reselect back to LTE once enter Idle mode.

UMTS -> LTE redirection (Service Based)

LTE Parameter	MML Command	Default value	Recommended value	Comments
LTECellIndex	ADD ULTECELL	NA	Cell ID of the co-located 3G F1 Cell ID	0~65535. Index of an external LTE cell
EUTRANCELLID		NA	eNodeBID x 256 + CellID	0~268435455. Trial shows this parameter could be any value for UMTS to LTE redirection actually.
TAC		NA	LTE TAC	Trial shows this parameter could be any value for U2L redirection
CellPHYID		NA	LTE PCI	This value MUST set correctly according to LTE cell planning, otherwise U2L redirection won't be triggered
SuppPSHOFlag		NotSupport	NotSupport	Don't enable PS Handover to LTE, means only redirection is allowed
RNCId	ADD ULTENCELL	NA	Source 3G RNC ID	To define LTE cell as UMTS cell neighbor. **All 3G cell need to define surrounding LTE cells as neighbor**
CellId		NA	Source 3G Cell ID	
LTECellIndex		NA	Target LTE Cell Index defined by *ADD ULTECELL*	
U2LTEMeasTime	SET UU2LTEHONCOV (RNC level)	30	30	If the LTE measurement time reaches this duration but U2L redirection still not performed, the LTE measurement is stopped, and the compressed mode will stopped if entered, to avoid affect 3G user throughput experience.
Hystfor3C	ADD UCELLU2LTEHONCOV (Cell Level - Optional)	4	4 [4*0.5=2dB]	
TargetRatThdRSRP		36	28	28+4*0.5-140 = -110dBm, to determine the RSRP threshold of target LTE signal for UMTS to LTE redirection
RabIndex	MOD UTYPRABBASIC	NA	All PS RAB need to set	To enable specified PS RAB should be redirection to LTE. All PS RAB bearer is recommended to set.
EUTRANSHIND		HO_TO_EUTRAN_SHALL_NOT_BE_PERFORM	HO_TO_EUTRAN_SHOULD_BE_PERFORM	
HoSwitch	SET UCORRMALGOSWITCH	HO_LTE_PS_OUT_SWITCH-0; HO_LTE_SERVICE_PS_OUT_SWITCH-0	HO_LTE_PS_OUT_SWITCH-1; HO_LTE_SERVICE_PS_OUT_SWITCH-1	To enable UMTS to LTE handover switch. But U2L Handover is disabled in U2L neighbor definition, so only U2L redirection will be performed

Inter-RAT PS/CS steering feature



Inter-RAT to U900 with priority:

- If exist U900 neighbor, then configure U900 as i-RAT neighbor and configure only 1 U2100 neighbor with BlindHoPririty for Redirection
- If exist U900 signal, then iRAT to U900
- If no U900 signal then blind redirection to U2100

1st try
2nd try

In meeting in 7th Mar 2013, L2U mobility strategy in connection mode changed, before L2U based on handover prioritize to U900 then U2100 F2, new strategy is to do blind redirection to UMTS F2 only. This slides just keep for backup if needed in future.

- With the Inter-RAT PS/CS Steering feature, U900 is set as the High Priority layer of L->U HO/CSFB
  - Both 1st and 2nd try of PS HO is triggered by coverage
  - 1st try of CSFB is triggered by service and 2nd try of CSFB is triggered by timer (eNodeB starts a timer after receiving the CSFB Indicator. If the UE remains in the coverage of the eNodeB when the timer expires, eNodeB will perform a blind redirection procedure for CSFB. Currently, the timer is fixedly to 4 seconds in eRAN 3.0.)
- Behavior of the 2nd try is blind redirection
- If UE doesn't support Inter-RAT measurement or handover, then it will just redirect to U2100 frequency

Inter-RAT PS/CS steering feature

LTE Parameter	MML Command	Default value	Recommended value	Comments
FreqLayerSwtich	MOD eNodeBALGO Switch	UtranFreqLayer MeasSwitch-0	UtranFreqLayerMeasSwitch-1	Enable Frequency Layer selective HO from L->U
PsPriority	MOD UTRANNFREQ	High_Priority	High_Priority for U900 Low_Priority for U2100	Set U900 as the High Priority for L->U HO, if U900 Neighbor not configured then only Handover to the low priority U2100
CsPriority		High_Priority	High_Priority for U900 Low_Priority for U2100	

In meeting in 7th Mar 2013, L2U mobility strategy in connection mode changed, before L2U based on handover prioritize to U900 then U2100 F2, new strategy is to do blind redirection to UMTS F2 only.
This slides just keep for backup if needed in future.

LTE -> UMTS – CS Fall Back

LTE Parameter	MML Command	Default value	Recommended value	Comments
HoAlgoSwitch	MOD eNodeBALGOSwitch	UTRANCsfbSwitch: Off	UTRANCsfbSwitch: On	Enable CSFB to UTRAN switch
HoModeSwitch		BlindHoSwitch:Off	BlindHoSwitch:On	Set to On: together with UTRANPsHoSwitch-0, to determine that only blind redirection to UMTS is adopted for CSFB. If set to Off: Disable blind handover switch to do CSFB to UTRAN with measurement
CsfbHoUTRANB1ThdRscp	MOD CSFALLBACKHO	-106	-103dBm	RSCP threshold for event B1 that is used in CS fallback to UTRAN. The actual threshold of starting CSFB is > -102dBm (-103dBm+1dB).
CsfbHoUTRANTimeToTrig		40ms	40ms	Time-to-trigger for event B1 that is used in CS fallback to UTRAN.

Only needed if BlindHoSwitch is Off.

LTE Parameter	MML Command	Default value	Recommended value	Comments
InterRatHighestPri	MOD CSFALLBACKBLINDHOCFG	UTRAN	UTRAN	Indicates the high-priority RAT to be considered in blind handovers for CS fallback.
InterRatSecondPri	MOD CSFALLBACKBLINDHOCFG	GERAN	NULL	Indicates the medium-priority RAT to be considered in blind handovers for CS fallback.
InterRatLowestPri	MOD CSFALLBACKBLINDHOCFG	CDMA2000	NULL	Indicates the low-priority RAT to be considered in blind handovers for CS fallback.

For CSFB, need core network support also (MSC need upgrade to R9).

In meeting in 7th Mar 2013, L2U mobility strategy in connection mode changed, before L2U based on handover prioritize to U900 then U2100 F2, new strategy is to do blind redirection to UMTS F2 only.
This slides just keep for backup if needed in future.

Issue when 3G Only SIM card in 4G UE

If enable U2L reselection or redirection

- Enable U2L reselection or redirection will help 4G SIM in 4G UE could come back to LTE ASAP if UE fallback or reselection to UMTS, but the concern is that if a 3G only SIM card is put into a 4G UE:

1. Idle Mode if enable 3G to LTE reselection:
   - By default, USN will reject the 3G IMSI TAU with cause "Network Failure", then the UE may keep on trying to reselect to LTE and suffering even not able to get service from 3G
   - Huawei USN will map the reject error from "Network failure" to "15 no suitable cells in tracing area"
     Then UE with 3G SIM will not try to register to LTE cell under the rejected TAL anymore, until UE is power off and power on again, or UE moves to another TAL

2. Connection Mode if enable 3G to LTE redirection:
   - By default, 3G RNC will always instruct the 4G UE to measure LTE signal and perform U2L redirection once LTE signal better than the redirection threshold, even if USN send TAU reject with "No suitable cells in tracking area" to UE

Issue when 3G Only SIM card in 4G UE

- If USN send all the 3G IMSI authentication request to HSS, then HSS will reject to USN, then USN will map the reject code (5420 DIAMETER ERROR UNKNOWN EPS SUBSCRIPTION or 5001 unknown user) to Cause Value 15 No Suitable Cell in TA
- Huawei USN V9R1SPC300 and above version can start counter for the error code from HSS 5420 and 5001 for each UE, if reach a certain times (default 3, recommend 1), then USN will send RAB Assignment Request which consists of "Handover to E-UTRAN shall not be performed" to RNC when user try to activate service in 3G, then RNC will not trigger LTE measurement for this UE even it is a 4G UE
- When later if the rejected 3G user subscribe LTE, and if the UE already succeed an TAU or Attach either by the UE automatically reselect to LTE (after the UE power off then power on) or the user manually reselect to LTE, then USN will clear the counter then the UE can redirect to LTE from 3G
- Since UE will store the rejected TAL by cause value 15 into a "black list", to avoid any service effect, it is recommend the user power off then power on the UE to clear all forbidden TAL from the "black list", thus UE will reselect back to the TAL that UE was previous rejected in before subscribe LTE.

Document Revision Record

Date	Revise Record	Remark
13th Sep 2012	1. Add UE cell selection procedure and related parameter 2. Change proposed SPriority in UMTS side to default 4 for all U900 and U2100 cells to avoid the possibility to affect cell reselection in UMTS 3. Change the value setting for UTranCellID from (RNC ID x 65536 + RNC cell ID) to 3G Cell ID only since 3G CellID in Maxis KV network is unique 4. Add description for parameter BlindHoA2ThdOffset assist to trigger InterRAT blind redirection 5. Add description for case 3G SIM card be put into 4G UE if enable 3G to 4G reselection or redirection, and solution for Maxis LTE phase 1 6. Add system information snapshot to show LTE and 3G cell select & reselect priority	
16th Oct 2012	1. Re Capture the SIB3 indicating the LTE cell reselection priority 2. Add description for the 4S timer for CSFB 3. Correct the Blind Redirection trigger parameter BlindHoA2ThdOffset	
8th Mar 2013	1. Add introduction for two parameters for UMTS layer priority and reselection threshold when define 2G to LTE reselection 2. Add introduction for UMTS to LTE redirection 3. As confirmed between Maxis and Huawei in 7th Mar, L2U mobility strategy in connection mode changed, before L2U based on handover prioritize to U900 then U2100 F2, new strategy is to do blind redirection to UMTS F2 only. 4. Maxis confirmed L1800 set higher reselection priority (priority 6) than L2600 (priority5)	
12th Mar 2013	1. Huawei R&D confirmed that 3G Ec/Io will be considered when introduce 2G to LTE reselection. It is recommended by Huawei to do trial to double confirm no impact to existing 2G to 3G reselection if enable 2G to LTE reselection	V 1.9
28th Mar 2013	1. Set priority of U900 for L2U reselection to 3, which is lower than U2100 priority (4), so UE will prioritize to reselect to U2100 if LTE is poor, if U2100 still poor then try U900, due to U900 is not really continuously coverage but will provide larger coverage compare to co-located U2100 2. Review all parameter setting and correct the parameter name typo	V 1.95

Remark:

1) All the parameters and MML commands in this document are based on eRAN3.0
2) Parameters may need to fine tune according to real network environment during optimization

Document Revision Record

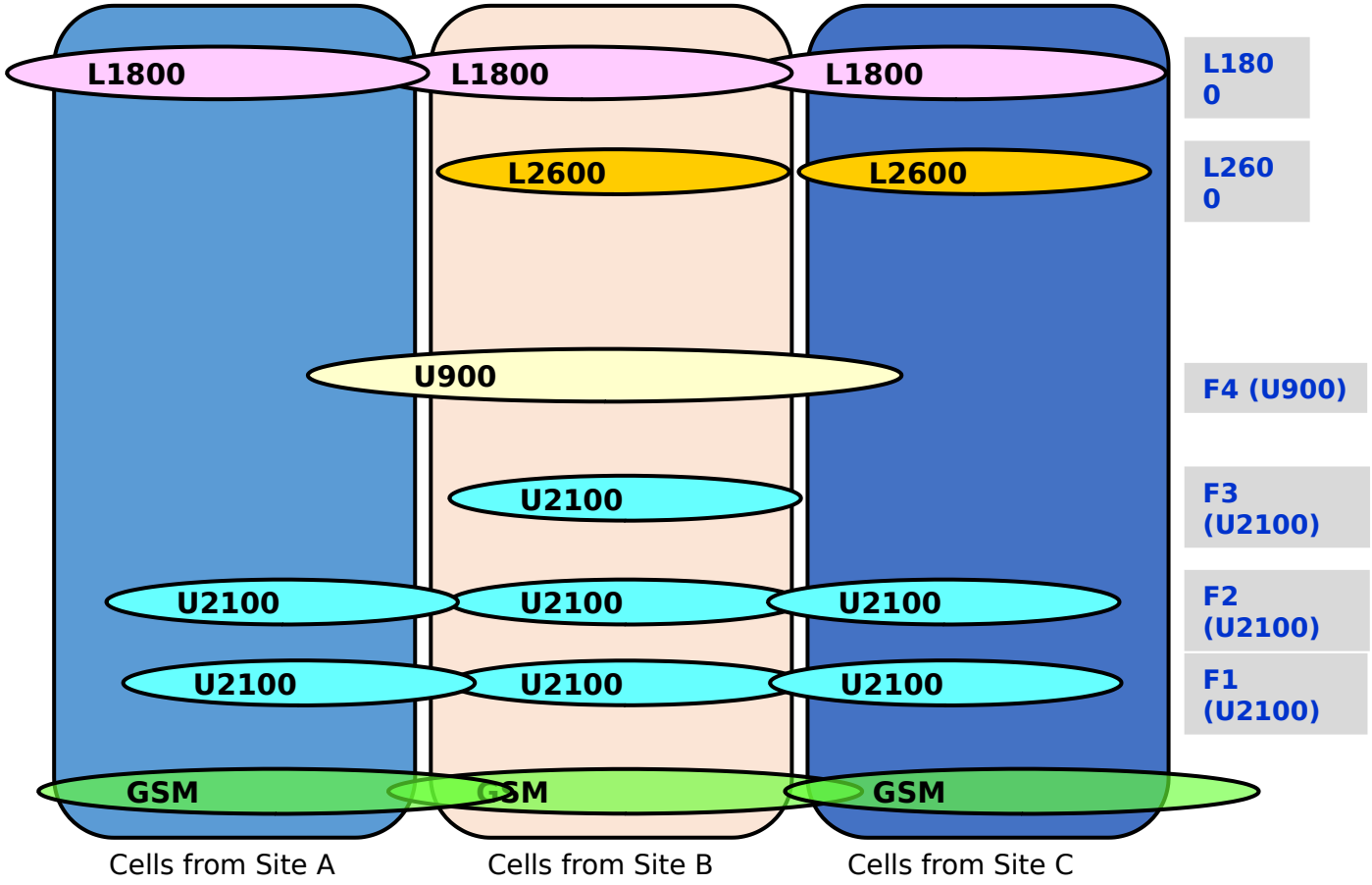
Date	Revise Record	Remark
17th Jun 2013	1. Change Inter-Frequency MLB parameter as per mutual agree based on trial result 2. Set cell select and reselection between LTE 1800 and LTE 2600 same priority (6) within LTE, while remain 3G/2G to LTE 1800 with higher priority (6) than to LTE 2600 (priority 5)	2.0
10th Sept 2013	1. Change U/G to LTE reselection priority for entire network (change in 2G & 3G), before L1800 has the highest priority (6), now L2600 has the highest priority (6) for GU to L reselection. Cell reselection between L1800 and L2600 remain same within LTE (both configure same priority 6)	2.1
10th-Sep-2014	1. For push the user to L2600. we need set the different priority for the L2600(6) and L1800(5) for the reselection 2. L2600 frequency=2850	2.2
15th-Nov-2014	1. UtranCELL ID already be seperated to two parameters (RNC ID and RNC Cell ID) on Eran6.0. Updated on the Page40 of this presentation.	2.3
25th-Nov-2014	1. Loaddiffload of Inter-fre MLB had been updated. (L2600=20, L1800=5). Result on the L1800 user push to L2600 is easier and hopefully keep user on the L2600.	2.4
6th-Feb-2015	1. For push the user from 3G to LTE when UE on idle mode • MOD CELLRESEL: SNonIntraSearch=8 (original value=9) • MOD CELLRESEL: ThrshServLow =6 (original value=7) • MOD EUTRANINTERNFREQ: THRESHXLOW=10; (Original value=11)	2.5

Remark:

1) All the parameters and MML commands in this document are based on eRAN6.0
2) Parameters may need to fine tune according to real network environment during optimization

Maxis Radio Network Structure

- 3 RAT in Maxis Radio Network: LTE, UMTS, GSM
- 5 layers involved in LTE Mobility Strategy: L1800, L2600, U900, F2(U2100) and GSM
- L1800 is sharing antenna with GSM1800 and L2600 is sharing antenna with U2100



Basic idea of Mobility Strategy

- Idle Mode:
  - L<->L: Intra-Freq, Inter-Freq reselection
  - L->U: coverage based reselection
    - U900 has lower priority than U2100
  - GU->L: reselection based on priority
- Connection Mode:
  - L<->L: Intra-Freq, Inter-Freq Handover
  - L->U: coverage based Handover for PS service and CSFB for Voice service
    - ~~U900 has higher priority than U2100~~
    - As confirmed between Maxis and Huawei in 7th Mar, L2U mobility strategy in connection mode changed, before L2U based on handover prioritize to U900 then U2100 F2, new strategy is to do blind redirection to UMTS F2 only.

Cell Selection procedure

36304 5.2.3.1 Cell Selection process Description

- The UE shall use one of the following two cell selection procedures:

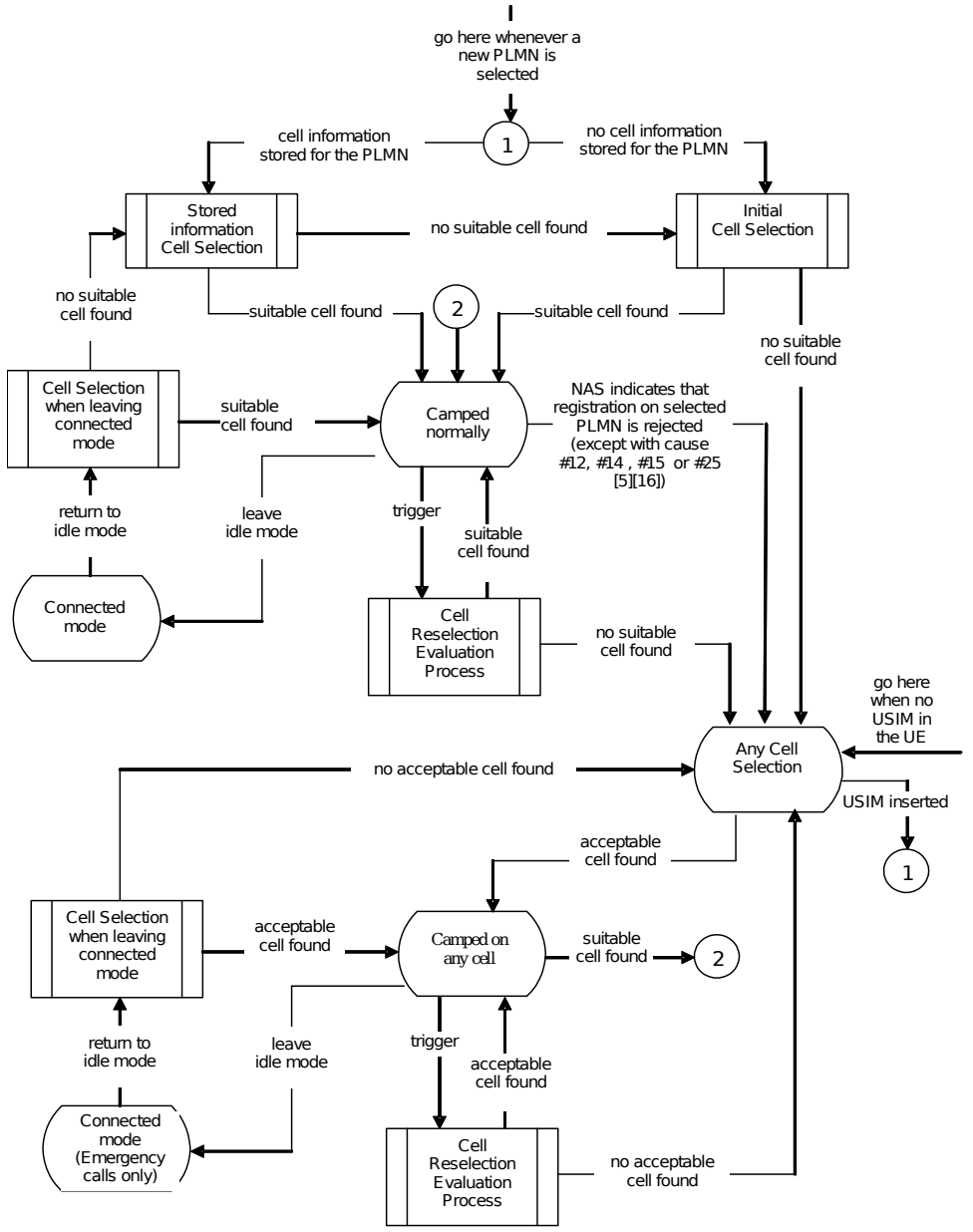
- **a) Initial Cell Selection**

  This procedure requires no prior knowledge of which RF channels are E-UTRA carriers. The UE shall scan all RF channels in the E-UTRA bands according to its capabilities to find a suitable cell. On each carrier frequency, the UE need only search for the strongest cell. Once a suitable cell is found this cell shall be selected.

- **b) Stored Information Cell Selection**

  This procedure requires stored information of carrier frequencies and optionally also information on cell parameters, from previously received measurement control information elements or from previously detected cells. Once the UE has found a suitable cell the UE shall select it. If no suitable cell is found the Initial Cell Selection procedure shall be started.

Note: Priorities between different frequencies or RATs provided to the UE by system information or dedicated signalling are not used in the cell selection process.



Cell Selection procedure

36.304 **5.2.3.2 Cell Selection Criterion**

The **cell selection criterion S** is fulfilled when:

$Srxlev > 0$ AND $Squal > 0$

where:

$Srxlev = Q_{rxlevmeas} - (Q_{rxlevmin} + Q_{rxlevminoffset}) - P_{compensation}$

$Squal = Q_{qualmeas} - (Q_{qualmin} + Q_{qualminoffset})$

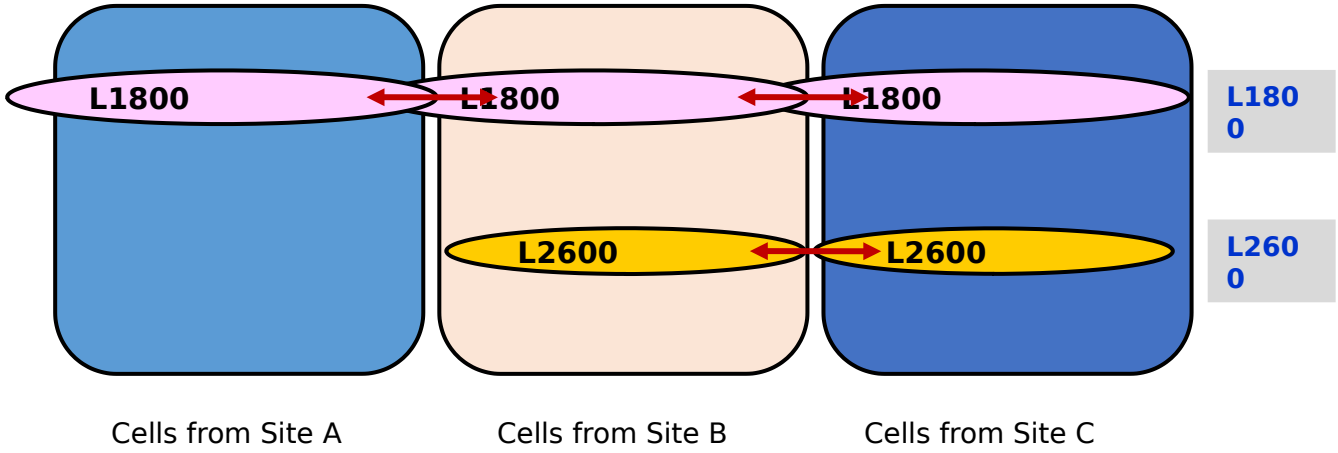
Where:

Srxlev	Cell selection RX level value (dB)	
Squal	Cell selection quality value (dB)	
$Q_{rxlevmeas}$	Measured cell RX level value (RSRP)	
$Q_{qualmeas}$	Measured cell quality value (RSRQ)	
$Q_{rxlevmin}$	Minimum required RX level in the cell (dBm)	-128dBm
$Q_{qualmin}$	Minimum required quality level in the cell (dB)	NA, means infinite. Only judge by RSRP
$Q_{rxlevminoffset}$	Offset to the signalled $Q_{rxlevmin}$ taken into account in the Srxlev evaluation as a result of a periodic search for a higher priority PLMN while camped normally in a VPLMN	0
$Q_{qualminoffset}$	Offset to the signalled $Q_{qualmin}$ taken into account in the Squal evaluation as a result of a periodic search for a higher priority PLMN while camped normally in a VPLMN	0
Pcompensation	$\max(P_{EMAX} - P_{PowerClass}, 0)$ (dB)	
P_{EMAX}	Maximum TX power level an UE may use when transmitting on the uplink in the cell (dBm) defined as P_{EMAX} in [TS 36.101]	
$P_{PowerClass}$	Maximum RF output power of the UE (dBm) according to the UE power class as defined in [TS 36.101]	Default: Null, parameter name: UePowerMax

The signalled values $Q_{rxlevminoffset}$ and $Q_{qualminoffset}$ are only applied when a cell is evaluated for cell selection as a result of a periodic search for a higher priority PLMN while camped normally in a VPLMN [5]. During this periodic search for higher priority PLMN the UE may check the S criteria of a cell using parameter values stored from a different cell of this higher priority PLMN.

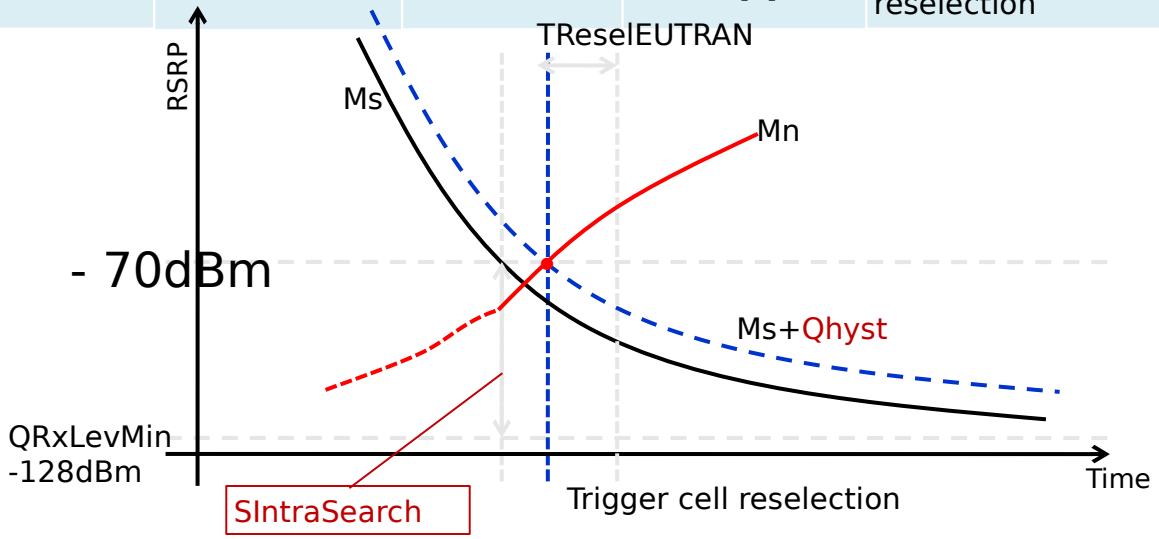
LTE <-> LTE (Intra-Freq) – Idle Mode Cell Reselection

- Intra-Frequency reselection will be triggered when UE moves toward out of the serving cell coverage area
- UE will reselect to the best cell that the RSRP is better than the serving cell



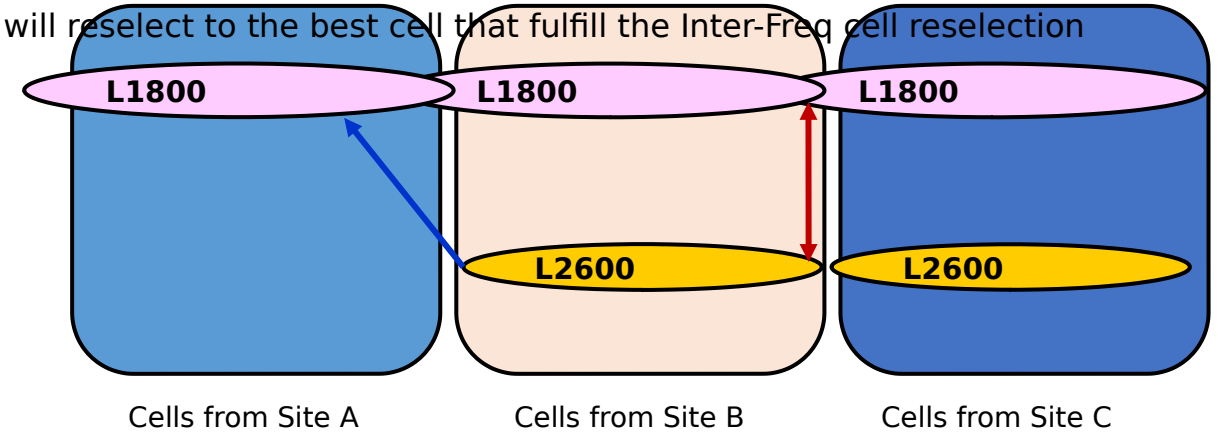
LTE <-> LTE (Intra-Freq) – Idle Mode Cell Re

LTE Parameter	MML Command	Default value	Recommended value	Comments
SIntraSearchCfgInd	MOD CELLRESEL	CFG	CFG	Enable Intra-Freq measurement based on serving cell signal. If set to Not-CFG, then UE will always scan Intra-Freq neighbor
SIntraSearch		29	29 [2dB] (-70dBm)	Measurement triggering threshold for reselection to Intra-Frequency cells
Qhyst		4	4 (dB)	Hysteresis for serving cell when ranking
QRxLevMin		-64	-64 [2dBm] (-128dBm)	Minimum required RX level for the cell to become a candidate during cell reselection
TReselEUTRAN		1	1 [s]	Time threshold for EUTRAN cell reselection



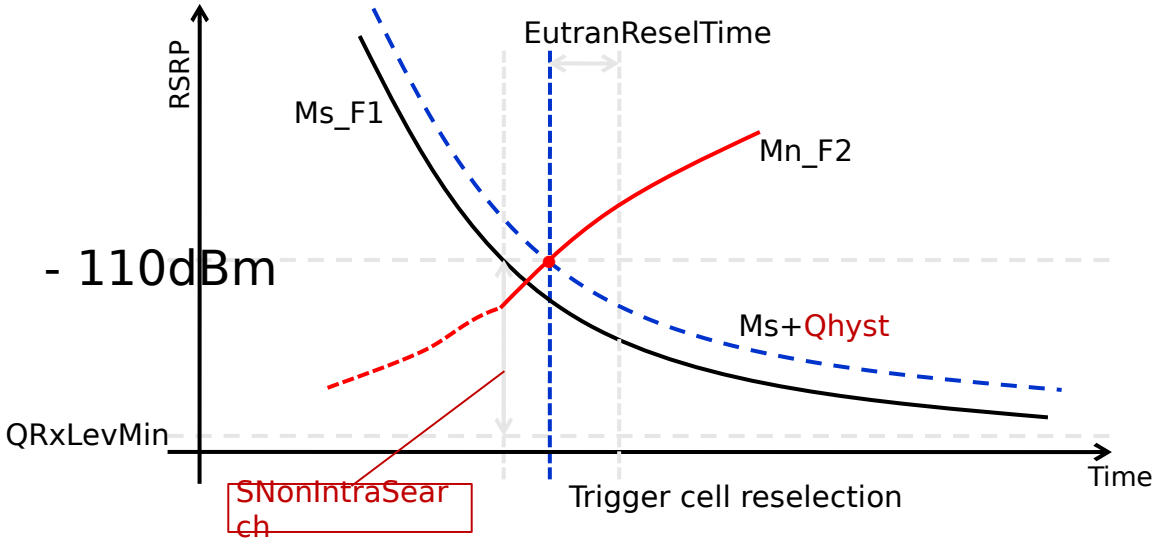
LTE <-> LTE (Inter-Freq) – Idle reselection (Same Priority)

- **Huawei propose to Maxis** that same reselection priority for L1800 and L2600 if they have same bandwidth
- Inter-Frequency reselection will be triggered when UE moves out of the serving frequency coverage area
- UE will reselect to the best cell that fulfill the Inter-Freq cell reselection



L1800	6
L2600	6

Reselection Priority between two LTE layers

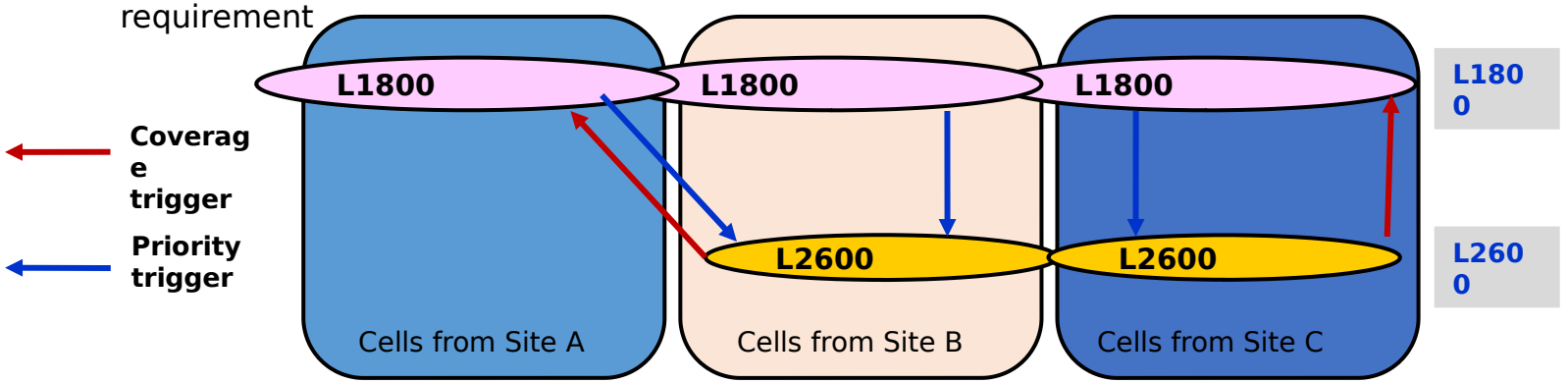


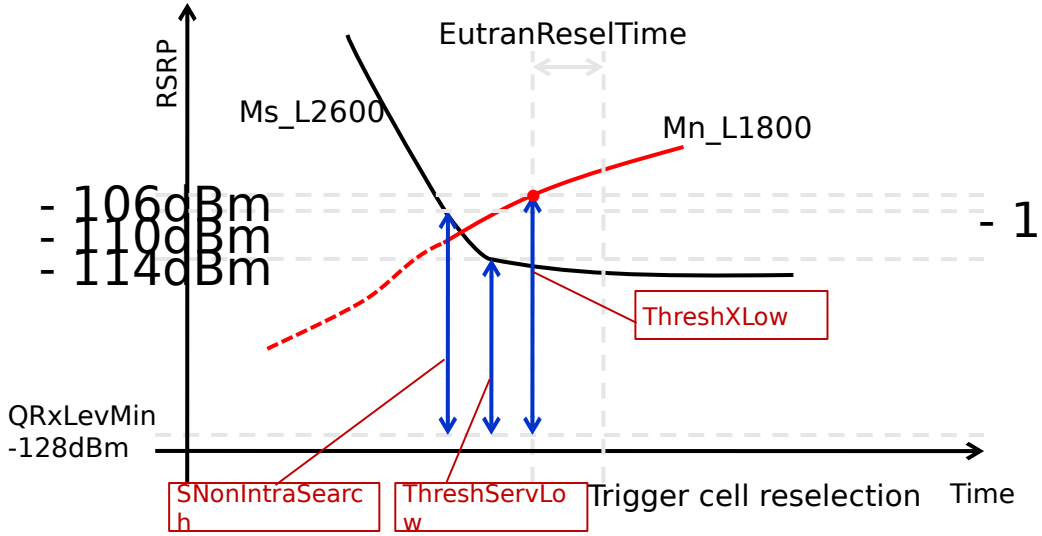
LTE <-> LTE (Inter-Freq) – Idle reselection (Same Priority)

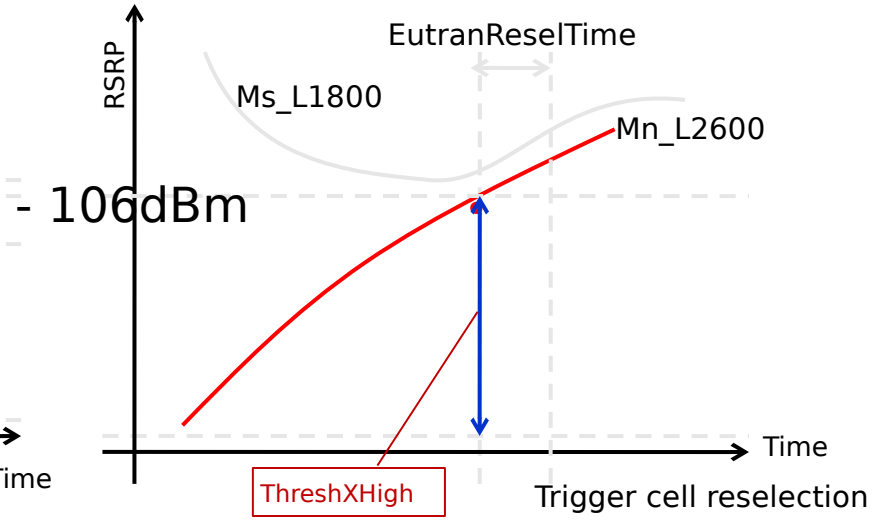
LTE Parameter	MML Command	Default value	Recommended value	Comments
CellReselPriority	MOD CELLRESEL	1	6	L1800 and L2600 cells have same cell priority which is higher than UMTS
SNonIntraSearchCfgInd		CFG	CFG	Enable Inter-Freq measurement
SNonIntraSearch		10	9 (2dB) (-110dBm)	Measurement triggering threshold for scan Inter-Frequency /Inter-RAT cells (-110 = -128+2*9)
Qhyst		4	4 (dB)	Hysteresis for serving cell when ranking
QRxLevMin		-64	-64 [2dBm] (-128dBm)	Minimum required RX level for the cell to become a candidate during cell reselection
TReselEUTRAN		1	1 [s]	Time threshold for EUTRAN cell reselection
QRxLevMin	ADD EUTRANINTERNFREQ	-64	-64 [2dBm] (-128dBm)	Minimum required RX level for the cell to become a candidate during cell reselection
EUTRANReselTime		1	1 [s]	Time threshold for inter-frequency cell reselection
DlEarfcn		NA	1299 for L1800 2850 for L2600	Define L1800 as L2600 cell reselection Inter-Freq Define L2600 as L1800 cell reselection Inter-Freq
CellReselPriorityCfgInd		NOT_CFG	CFG	If this parameter is not specified or set to NOT_CFG, then UE won't reselect to neighboring cells on the frequency
CellReselPriority		1	6	L1800 and L2600 cells have same cell priority which is higher than UMTS

LTE <-> LTE (Inter-Freq) – Idle reselection (Different Priority)

- **Huawei propose for Maxis** to set higher reselection priority for frequency with larger bandwidth (Assume L2600 has 20MHz and L1800 has 10MHz bandwidth)
- Inter-Frequency reselection will be triggered when UE moves out of the Higher Priority frequency serving area
- UE will reselect to the Higher Priority frequency once the higher priority frequency fulfill the requirement







LTE <-> LTE (Inter-Freq) – Idle reselection

2014-Sep-10th base on the Fahis meeting

LTE Parameter	MML Command	Default value	Recommended value	Comments
CellReselPriority	MOD CELLRESEL	1	**6 for L2600** **5 for L1800**	L1800 has highest priority followed by L2600, which is higher than UMTS and GSM
SNonIntraSearchCfgInd		CFG	CFG	Enable Inter-Freq measurement
SNonIntraSearch		10	**9**[2dB] (-110dBm)	Measurement triggering threshold for scan Inter-Frequency /Inter-RAT cells (-110 = -128+2*9)
ThrshServLow		10	7[2dB] (-114dBm)	Measurement triggering threshold for reselection to Inter-Frequency /Inter-RAT cells (-114 = -128+2*7)
ThreshXHigh	ADD EUTRANINTERNFREQ	11	11[2dB] (-106dBm)	RX level required for a neighboring cell on the frequency to become a candidate for reselection if the priority of the frequency is higher than that of the serving frequency. Ensure this is > Snonintrasearch and > A2 event (A2ThdRsrp - Hyst) to allow UE has time to look for other LTE frequency and avoid pingpong reselection
ThreshXLow		11	10[2dB] (-106dBm)	Minimum RX level required for a neighboring cell on the frequency to become a candidate for reselection if the priority of the frequency is lower than or equal to that of the serving frequency. Ensure this is > Snonintrasearch and > A2 event (A2ThdRsrp - Hyst) to allow UE has time to search other LTE frequency and avoid Ping Pong handover
QRxLevMin		-64	-64 [2dBm] (-128dBm)	Minimum required RX level for the cell to become a candidate during cell reselection
EUTRANReselTime		1	1 [s]	Time threshold for inter-frequency cell reselection
DlEarfcn		NA	1299 for L1800 2850 for L2600	Define L1800 as L2600 cell reselection Inter-Freq Define L2600 as L1800 cell reselection Inter-Freq
CellReselPriorityCfgInd		NOT_CFG	CFG	If this parameter is not specified or set to NOT_CFG, then UE won't reselect to neighboring cells on the frequency
CellReselPriority		NA	**6 for L2600** **5 for L1800**	L1800 has highest priority followed by L2600, which is higher than UMTS and GSM

Assume: L1800 has higher priority than L2600

2015-Feb-6 : Base on maxis Fahis requirement. For push user from 3G, change : Snonintra search from 9 to 8; Thrshserv low from 7 to 6 .. Change

Pro&Con analysis if set 2.6G higher priority

(Assume L2600 has larger bandwidth)

- Pro:
  - UE will always prefer to stay at 2.6G and initial service to get better experience (especially if L2600 has larger bandwidth then UE may get higher peak throughput)
  - Load may shift to 1.8G if 2.6G load is high
  - For these LTE UE that only support L1800, it will go to L1800, and dual band LTE phone will prioritize to L2600 thus the load between L1800 and L2600 would have a initial balanced load
- Con:
  - In 1.8G coverage area without 2.6G coverage, UE will try to measure 2.6G to cause extra battery consumption

Pro&Con analysis if set 1.8G higher priority

- Pro: (Assume L2600 has larger bandwidth)
  - UE prioritize to stay in 1.8G, which has better coverage than that of 2.6G to reduce battery consumption due to Inter-Frequency reselection
- Con:
  - UE will always initial services from 1.8G cell, which will cause 1.8G cell easy to congestion and user experience may not as good as that in 2.6G
  - For compatible with iPhone 5, UMTS to LTE redirection can only choose L1800 as target layer, this may also cause most of the connect UE fall in L1800 to degrade throughput experience while L2600 is much spare
  - So far only MLB could balance load from 1.8G to 2.6G, but MLB require target Inter-Freq cell load lower than serving cell, thus still most possibility there will be higher load in 1.8G than in 2.6G
- A third candidate solution: set 1.8G and 2.6G with same priority

Pro&Con analysis if set same priority

(Assume L2600 has larger bandwidth)

- Pro:
  - UE no need to search Inter-Freq if stay in frequency center area to cause battery consumption
  - UE almost randomly select to 1.8G and 2.6G, which could help to balance load
- Con:
  - UE still could not always prefer to allocate service on 2.6G

Huawei propose: set 2.6G higher priority

- If 2.6G set higher priority
  a) For USB modem UE, battery consumption is not an issue since it will be plug into USB for charging
  b) For smartphone, the LCD screen and other activities (surf, email, talking, etc) are major cause for battery consumption rather than idle mode cell reselection
  c) iPhone 5 only support L1800 cannot support L2600, and most of other LTE phone support both L1800 and L2600, so iPhone 5 will register to L1800 and other phone register to L2600, this will initial a balanced load between L1800 and L2600

Maxis decide to set 1.8G higher priority

Decided in 06th Mar 2013

- Maxis decided to set L1800 higher priority than L2600
  - To avoid any incompatible issue with LTE UEs that support L1800 but don't support L2600
  - L1800 priority set to 5 and L2600 priority set to 6
  - Inter-Frequency MLB will be the method to balance the load between two layers
- Huawei propose to review and consider if need to change in future when commercial user grows up
- From 08th May, 2013, Huawei and Maxis is doing trial to set L1800 and L12600 has same priority (6) within LTE system, and from 2G/3G to LTE still remain prioritize to L1800
  - No negative result was seen from the trial in cluster 1b and 1c

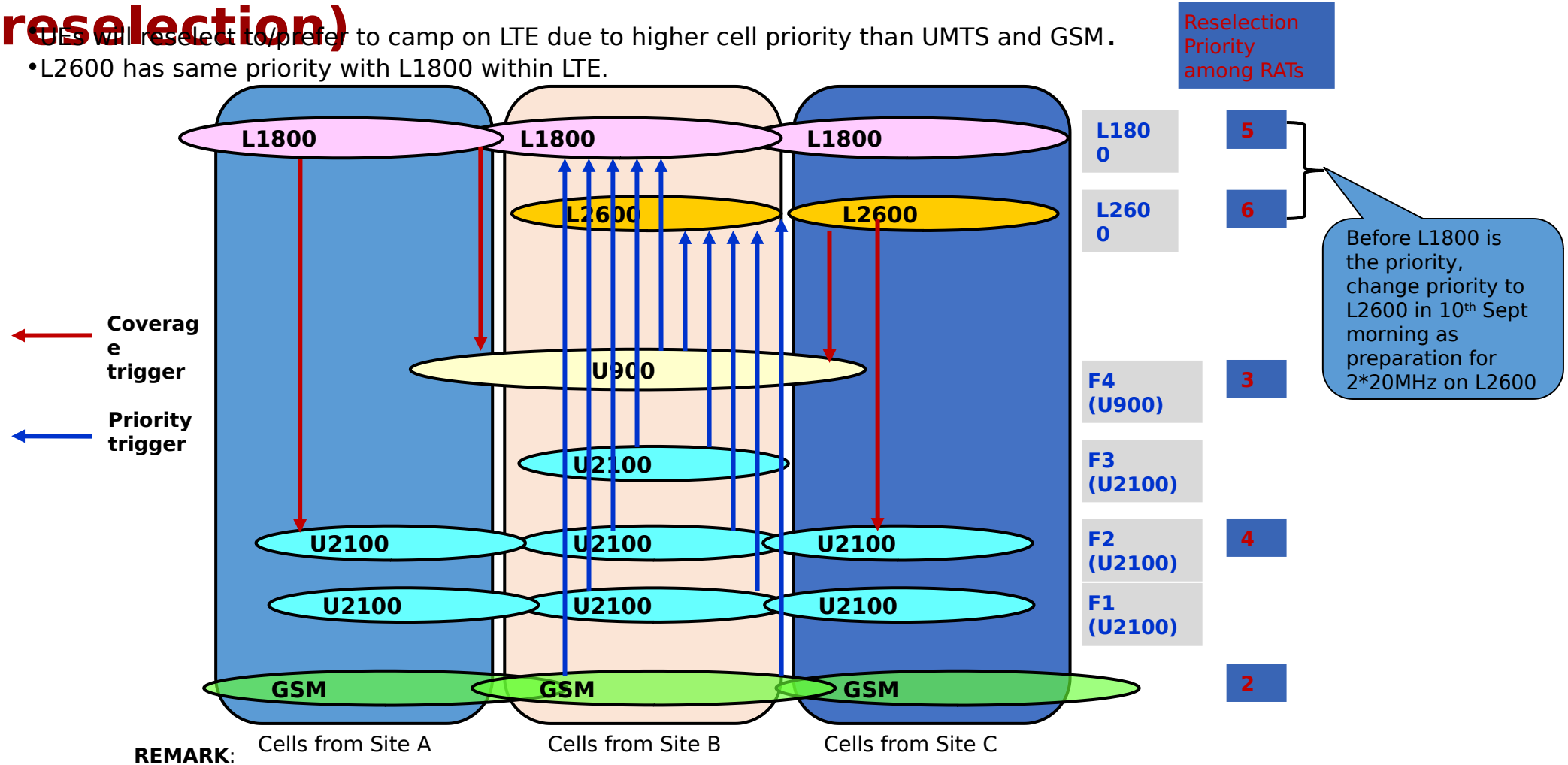
L1800 and L2600 are set same priority based on trial

Implement in 17th Jun 2013

- L1800 and L2600 are set same priority according to trial result
  - Both priority of L1800 and L2600 are set to 6
  - To allow user idling in both layers, to offload L1800 naturally
  - When reselect from 3G/2G to LTE, still remain L1800 has higher priority (6) than L2600 (5)

LTE Mobility – Idle Mode (Inter-RAT reselection)

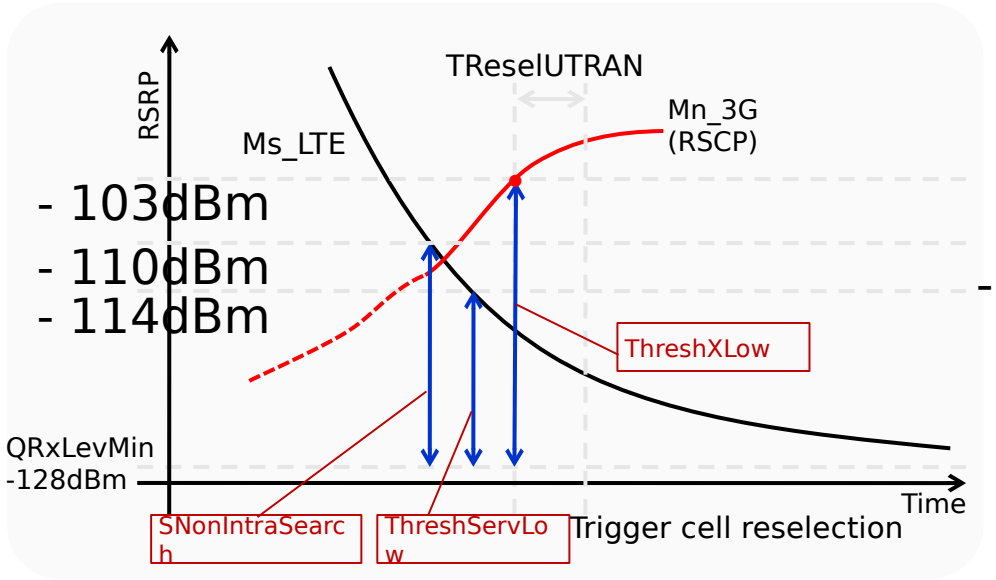
- UEs will reselect to/prefer to camp on LTE due to higher cell priority than UMTS and GSM.
- L2600 has same priority with L1800 within LTE.



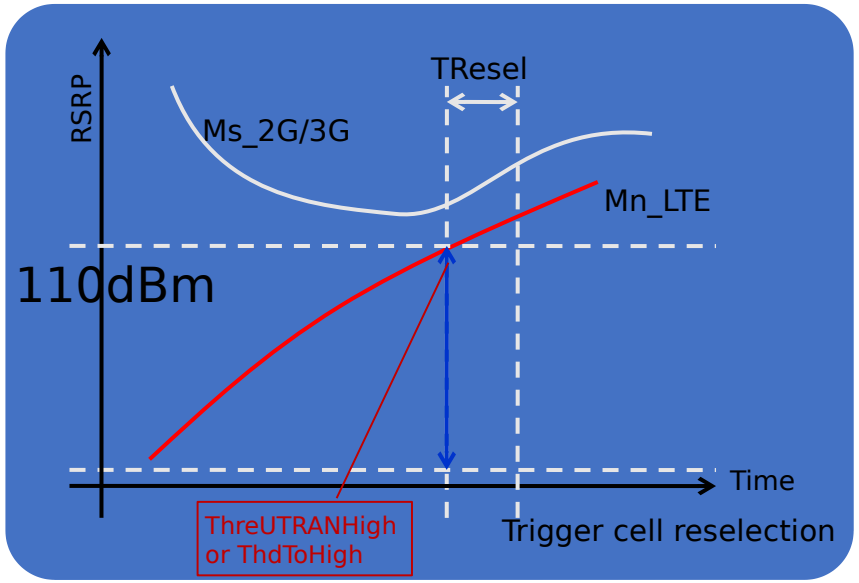
REMARK:

- L->U (F2) reselection will be triggered only when LTE signal is low and UMTS signal fulfill requirement.
- G->L and U->L reselection is based on priority (UE prefer to stay in LTE).
- UE will reselect back to LTE from 3G/2G once LTE signal beyond the threshold.

LTE Mobility – Idle Mode (Inter-RAT)



Only when LTE RSRP < -114dBm and UMTS RSCP > -103dBm during 1 second, then reselect to UMTS



- Once LTE RSRP > -110dBm during 1 second, then reselect to LTE
- If different reselection priority are set for different LTE frequency, then UE will search the prioritize frequency first, if no suitable cell then select second priority frequency.

LTE -> UMTS – Idle reselection

LTE Parameter	MML Command	Default value	Recommended value	Comments
SNonIntraSearchCfgInd	MOD CELLRESEL	CFG	CFG	Enable EUTRAN Inter-Frequency and IRAT measurement
SNonIntraSearch		10	8 [2dB] (-112dBm)	Threshold to measure EUTRAN Inter-Frequency and IRAT. Ensure this is < ThdToHigh and >= ThrshServLow to avoid ping pong and allow UE time to look for EUTRAN Inter-Frequency and UMTS
ThrshServLow		10	6 [2dB] (-116dBm)	threshold used in the evaluation for reselection to a neighboring cell on a lower-priority inter-RAT frequency.
CellReselPriority		7	6 for L1800 5 for L2600	LTE priority is always higher than URAN , and L1800 higher than L2600
QRxLevMin	MOD CELLSEL	-64	-64 [2dBm] (-128dBm)	Indicates the minimum required RX signal level used in the evaluation for cell selection.
CellReselPriorityCfgInd	ADD UTRANNFREQ	NOT_CFG	CFG	Enable cell reselection priority configuration . **If reselection priority is not configured , UE won't reselect to the 3G frequency.**
CellReselPriority		1	3(U900) 4(2100)	U2100 priority is higher than U900 but lower than LTE (prefer to stay in LTE) , UE will prioritize to stay in U2100. When U2100 coverage is poor then UE can try U900. Due to U900 is not co-located with all U2100.
ThreshXLow		6	6 [2dB] (-103dBm)	The RX signal level threshold used in reselection to neighboring cells on a lower-priority UTRAN frequency.
PmaxUTRAN		33	24 [dBm]	The maximum UE power in UTRAN
QRxLevMin		-58	-58 [2dBm] (-115dBm)	Minimum RSCP level to camp on UMTS
UTRANDLARFCN		NA	10662 for U2100 2939 for U900	DL UARFCN of the neighboring cell on the UTRAN frequency
TReselUTRAN	ADD CELLRESELUTRAN	1	1 [s]	Cell reselection duration of UTRAN cell reselection; Enable SIB6 broadcast (if don't set this MML, then L2U reselection won't trigger)

Same as setting in Intra-Freq reselection

2015-Feb-6 :
Base on maxis Fahis requirement. For push user from 3G, change : Snonintrasearch from 9 to 8; Thrshservlow from 7 to 6 .. Change EutranNfre-ThreshXlow from 11 to 10.

- For L->U reselection measurement, only RSCP is defined by 3GPP 36.304in 5.2.4.5 (E-UTRAN inter-frequency and inter-RAT Cell Reselection criteria)

Cell reselection priority in System Information (LTE part)

L3 Messages

Time	TimeStamp	Channel	Direction	Message
03:35:37.064	1030131347586093	DL-DCCH	eNodeB->MS	RRCConnectionRelease
03:36:27.943	1030131398513687	PCCH	eNodeB->MS	Paging
03:36:29.221	1030131399793625	PCCH	eNodeB->MS	Paging
03:36:30.415	1030131400989500	BCCH-DL-SCH	eNodeB->MS	SystemInformationBlockType1
03:36:30.420	1030131400995468	BCCH-BCH	eNodeB->MS	MasterInformationBlock
03:36:30.450	1030131401026375	BCCH-DL-SCH	eNodeB->MS	SystemInformation
03:36:30.568	1030131401146406	BCCH-DL-SCH	eNodeB->MS	SystemInformation
03:36:32.966	1030131403549500	BCCH-DL-SCH	eNodeB->MS	SystemInformationBlockType1
03:36:32.971	1030131403555437	BCCH-BCH	eNodeB->MS	MasterInformationBlock

Message Browser - MsgExplain

```
sib3
  cellReselectionInfoCommon
  cellReselectionServingFreqInfo
    s-NonIntraSearch:0x18 (24)
    threshServingLow:0x18 (24)
    cellReselectionPriority:0x6 (6)
```

LTE serving cell reselection priority in SIB 3

```
systemInformation
criticalExtensions
systemInformation-r8
sib-TypeAndInfo
CHOICE
sib6
carrierFreqListUTRA-FDD
CarrierFreqUTRA-FDD
  carrierFreq:0xb7b (2939)
  cellReselectionPriority:0x4 (3)
  threshX-High:0x6 (6)
  threshX-Low:0x6 (6)
  q-RxLevMin:-0x3a (-58)
  p-MaxUTRA:0x18 (24)
  q-QualMin:-0x16 (-22)
CarrierFreqUTRA-FDD
  carrierFreq:0x29a6 (10662)
  cellReselectionPriority:0x3 (4)
  threshX-High:0x6 (6)
  threshX-Low:0x6 (6)
  q-RxLevMin:-0x3a (-58)
  p-MaxUTRA:0x18 (24)
  q-QualMin:-0x16 (-22)
t-ReselectionUTRA:0x1 (1)
```

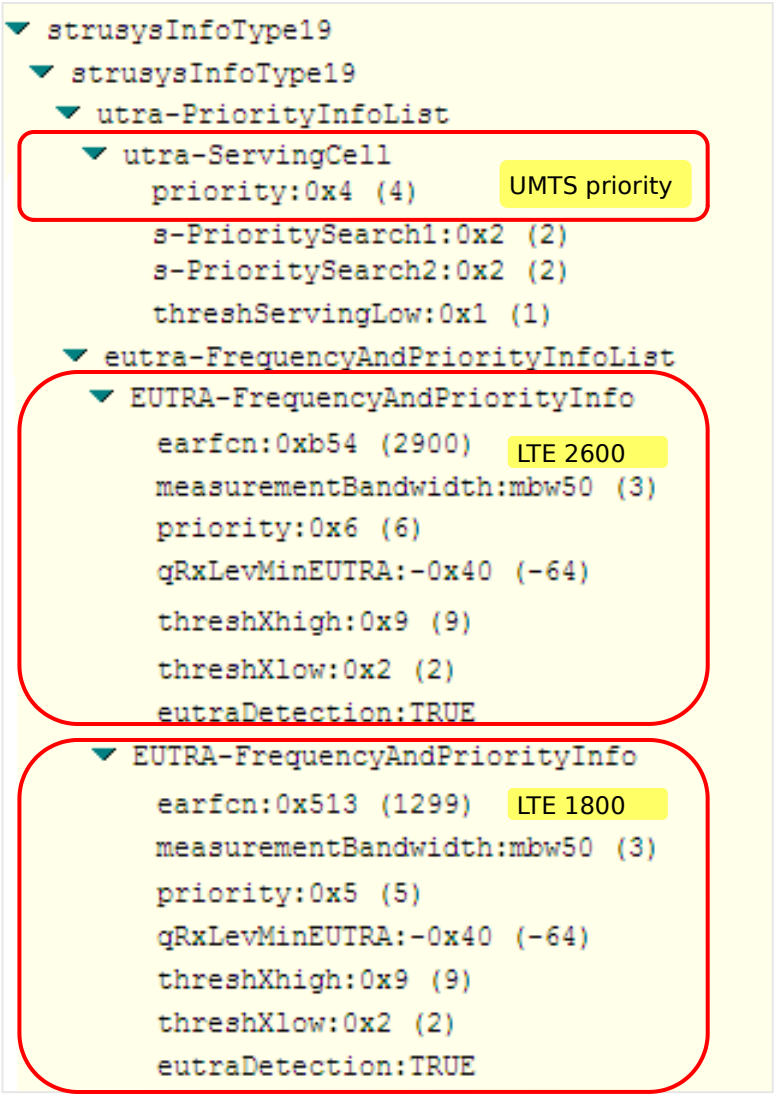
3G neighbor frequencies reselection priority in SIB6

Set U2100 reselection priority higher than U900 but lower than LTE (prefer to stay in LTE) , UE will prioritize to search U2100 if LTE signal is poor. When U2100 coverage is also poor then UE will try U900. Due to U900 is not really continuously cover the city.

Cell reselection priority in 3G SIB 19

Trace T...	Dire...	Message Type
UU Trace	To-UE	RRC_SYS_INFO_TYPE1
UU Trace	To-UE	RRC_SYS_INFO_TYPE2
UU Trace	To-UE	RRC_SYS_INFO_TYPE3
UU Trace	To-UE	RRC_SYS_INFO_TYPE5
UU Trace	To-UE	RRC_SYS_INFO_TYPE11
UU Trace	To-UE	RRC_SYS_INFO_TYPE12
UU Trace	To-UE	RRC_SYS_INFO_TYPE_SB1
UU Trace	To-UE	RRC_SYS_INFO_CHANGE_IND
UU Trace	To-UE	RRC_SYS_INFO_TYPE1
UU Trace	To-UE	RRC_SYS_INFO_TYPE2
UU Trace	To-UE	RRC_SYS_INFO_TYPE3
UU Trace	To-UE	RRC_SYS_INFO_TYPE5
UU Trace	To-UE	RRC_SYS_INFO_TYPE11
UU Trace	To-UE	RRC_SYS_INFO_TYPE12
UU Trace	To-UE	RRC_SYS_INFO_TYPE19
UU Trace	To-UE	RRC_SYS_INFO_TYPE_SB1

Start from 10th Sept 2013, LTE 2600 priority is higher than LTE 1800 for U to L reselection.



UMTS -> LTE – Idle reselection (set at 3G side)

UMTS Parameter	MML Command	Default value	Recommended value	Comments
	SET LICENSE		SETOBJECT=UMTS, ISPRIMARYPLMN=YES, FUNCTIONSWITCH5=UL_MOBILITY_P1-1	Enable License for UMTS to LTE reselection
EARFCN	ADD UCELLNFREQPRIOINFO	NA	1299 for L1800, 2900 for L2600	LTE EARFCN
NPriority		NA	5 for L1800 6 for L2600	LTE cell reselection priority (UMTS:4, GSM: 2) Before 10th Sept 2013: 5 for L2600 and 6 for L1800
EMeasBW		D6	D50	measurement bandwidth information common on the target frequency
ThdToHigh		2	9 [2dB] (-110dBm)	Ensure this is > Snonintrasearch and > A2 Event (A2ThdRsrp - Hyst) to avoid ping pong reselection or handover to 3G right after connected
Eqrxlevmin		-70	-64 [2dBm] (-128dBm)	Minimum RSRP level to camp on LTE
SPriority	MOD UCELLSELRESEL	4	4	UMTS cell priority lower than LTE (UE will always search LTE) . To set both U900 and U2100 has same priority in UMTS side then it won't affect UMTS cell reselection.
SibCfgBitMap	ADD UCELLSIBSWITCH	NA	SIB19-1	Enable SIB 19 for UMTS to LTE reselection

For 3G to LTE reselection, no need to define 3G to LTE neighbor relationship, only LTE frequency, bandwidth and priority parameters are required for each UMTS cell.

U to L reselection if multiple higher LTE layers configured

- From 3GPP 25304, UE shall measure all inter-RAT layers with higher priority than serving cell, and reselect to the higher Srxlev cell on the highest priority layer.
- Based on this, if more than one LTE higher priority layers are set in 3G for U to L reselection, UE shall measure all LTE layers regardless they are same or different priority, and reselect to the highest layer with higher RSRP.
  - If UE doesn’t support L26, then it will measure L1800 only then reselect to L18.
  - If UE support both L1800 and L2600, UE shall measure both layer.

3GPP 25304 5.2.6.1.2a:

- If the UE has received absolute priority information for inter-RAT layers, the UE shall follow these rules:
- - The UE shall perform measurements of inter-RAT layers with a priority higher than the priority of the current serving cell.

3GPP 25304 5.2.6.1.4a:

The following definitions apply:

- Criterion 1: the SrxlevnonServingCell,x of a cell on an evaluated higher absolute priority layer is greater than Threshx,high during a time interval Treselection;

  (Remark: Criterion 2 and 3 in same session define reselection creteria to layer with same or lower priority)
- Cell reselection to a cell on a higher absolute priority layer than the camped frequency shall be performed if criterion 1 is fulfilled.
- If more than one cell meets the above criteria, the UE shall reselect the cell with the highest SrxlevnonServingCell,x among the cells meeting the criteria on the highest absolute priority layer.

GSM -> LTE – Idle reselection (set at GSM

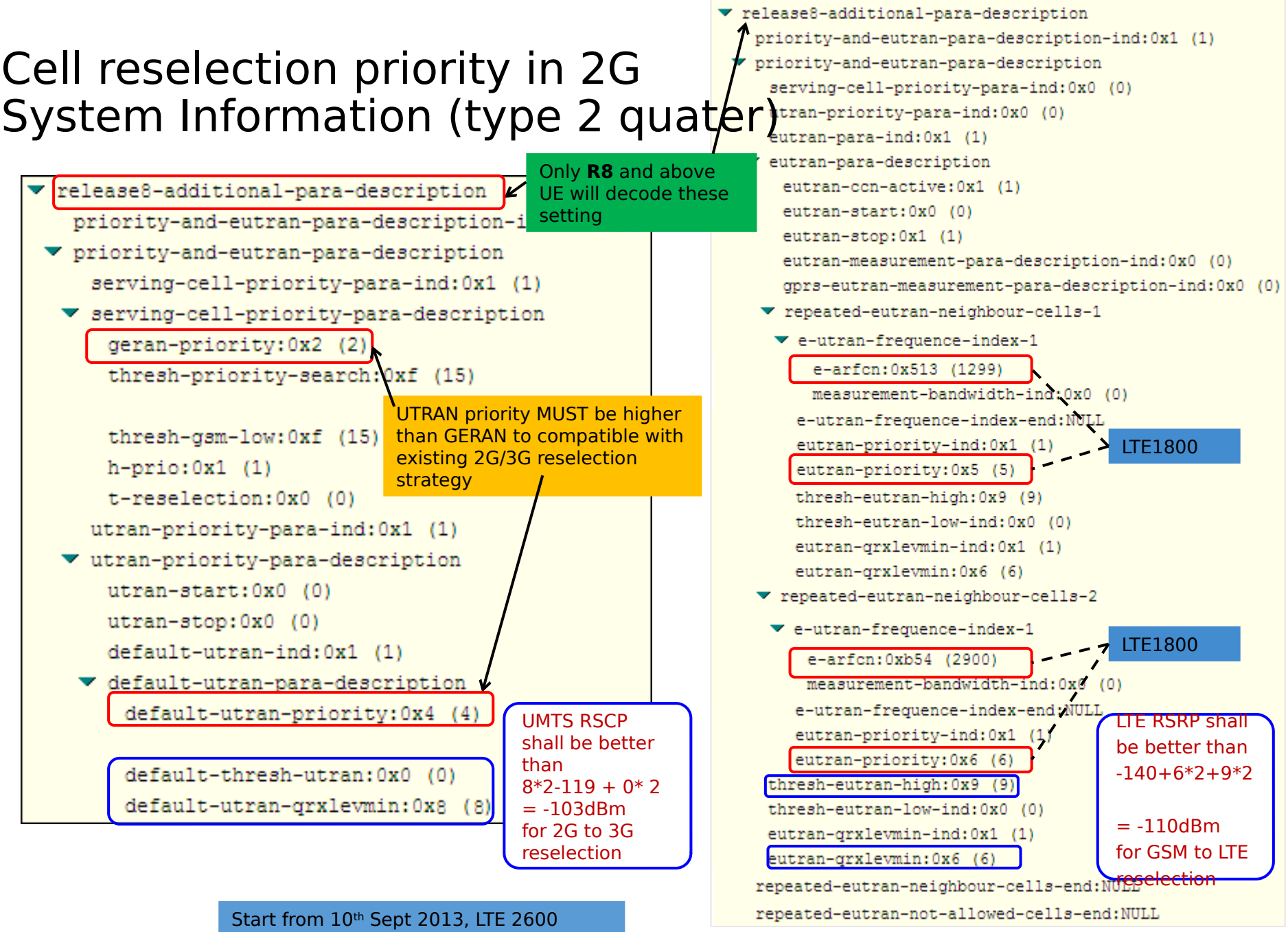
GSM Parameter	MML Command	Default value	Recommended value	Comments
GERANPri	SET GCELLPRIEUTRANSYS (All GERAN carriers)	7	2	Set LTE highest priority then 3G and GSM the lowest priority.
UTRANPri		1	4	
EUTRANPri		0	6	THRUTRANHIGH and UTRANQRXLEVMIN determine the threshold for UE reselect from 2G to 3G is: -103dBm +0dB = -103dBm, matching to existing 2G/3G reselection setting (-102dBm)
THRUTRANHIGH		20	0 (0*2dB=0dB)	
THRUTRANLOW		20	0 (0*2dB=0dB)	R7 and older UE won't decode parameters in this command, and will follow existing 2G/3G reselection setting.
UTRANQRXLEVMIN		9	8 (8*2-119 = -103dBm)	For R8 and above UE, 2G/3G priority and threshold in this command will overwrite the existing 2G/3G reselection setting. So we must set UTRAN priority higher than GSM, to ensure R8 and above UE can reselect to UMTS as priority.
ThrEUTRANHigh		9	9 [2dB] (-110dBm)	RSRP threshold for reselect to LTE from 2G. Ensure higher than Snonintrasearch and A2 Event to avoid ping pong reselection (-128+9*2=-110dBm)
THRPRISEARCH		NA	15	Enable UE always search UMTS or LTE in idle mode
THREUTRANLOW		9	9 [2dB] (-110dBm)	
EUTRANQRXLevMin		6	6 [2dB] (-128dBm)	Minimum RSRP level to camp on LTE (-140+2*6=-128)
THRGSMLOW		0	15	Always search 3G or LTE signal when UE in GSM
QPEUTRAN		15	7	UE always search LTE signal when UE has PDP in GSM
HPRIO		0	1 (5dB)	0 (∞), 1(5dB), 2 (4dB), 3 (3dB). Refer to 3GPP 45008 6.6.6 Algorithm for inter-RAT cell re-selection based on priority information

GSM -> LTE – Idle reselection (set at GSM side)

GSM Parameter	MML Command	Default value	Recommended value	Comments
EXTLTECELLID	ADD GEXTLTECELL Dummy LTE cell can be defined, only EARFCN and Duplexer mode(FDD or TDD) will broadcast to UE in SIB 2 quater	NA	8048 and above	Index of a LTE external cell, shall be unique within a 2G BSC
FREQ		NA	1299 for L1800, 2900 for L2600	LTE EARFCN
EUTRANTYPE		NA	FDD	Indicate the LTE cell is TDD or FDD
SptResel	ADD GLTENCELL (All GERAN carriers)	NA	SUPPORT	Enable cell reselection to LTE cell.
NCELLPRI		255	6 for L2600 5 for L1800	Define different reselection priority for different LTE frequency Before 10th Sept 2013: 5 for L2600 and 6 for L1800
LTECellReselEN	SET GCELLHOBASIC	No	Yes	To enable reselection from GSM to LTE

For GSM to LTE reselection, need to define at least one LTE neighbor for each LTE frequency for each GSM cell.
Two dummy neighbors for L1800 and L2600 are introduced to realize the GSM to LTE reselection in Maxis network.

Cell reselection priority in 2G System Information (type 2 quater)



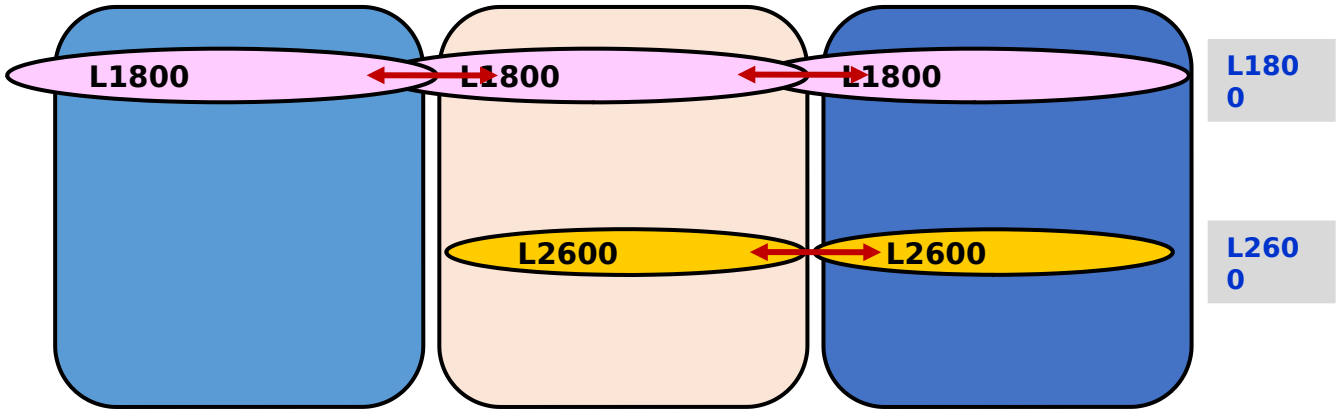
Start from 10th Sept 2013, LTE 2600 priority is higher than LTE 1800 for G/U to L reselection.

Effect if enable 2G to LTE reselection

- Reselection to 3G will be longer for LTE compatible UE if LTE signal is not good enough
  - 2 new SIB 2quater are introduced for 2G to LTE reselection, and each SIB will take 3~4 S for UE to receive. Only after UE receives all SIB 2quater the UE will start Inter-RAT measurement if 2G is the lowest layer. Thus 2G to 3G reselection will prolong 6~8S more, compare to that if 2G to LTE reselection not introduced.
- Normal 2G to UMTS reselection will be replaced by the “priority reselection”
  - Need to set UMTS priority higher than 2G and lower than LTE to compatible with existing “normal” 2G to 3G reselection criteria
  - From 3GPP 45008, *6.6.6 Algorithm for inter-RAT cell re-selection based on priority information*:
    ……. (describe the priority based Inter-RAT reselection from 2G to 3G or LTE)
    A UTRAN FDD cell shall only be reselected if, in addition to the criteria above, its measured Ec/No value is equal to or greater than *FDD_Qmin - FDD_Qmin_Offset.*
    So from above, we can see UE will evaluate both RSCP and Ec/Io before reselect to 3G.

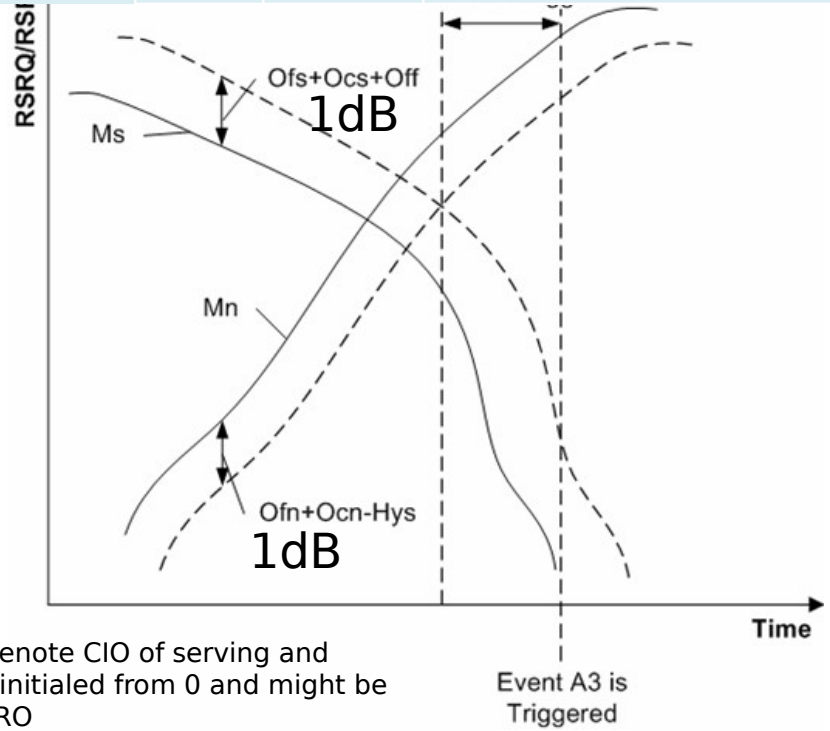
LTE <-> LTE (Intra-Freq Handover)

- Intra-Freq HO will occur if UE moves within LTE same frequency coverage area triggered by A3 event



LTE <-> LTE (Intra-Freq Handover)

LTE Parameter	MML Command	Default value	Recommended value	Comments
IntraFreqHoA3Hyst	MOD INTRAFREQHOGROUP	2	2[0.5dB] (1dB)	Intrafreq handover hysteresis for event A3
IntraFreqHoA3Offset		2	2[0.5dB] (1dB)	Intrafreq handover offset for event A3
IntraFreqHoA3TimeToTrig		320	320ms	Intrafreq handover time to trigger
IntraFreqHoA3TrigQuan	MOD INTRARATHOCOMM	RSRP	RSRP	The quantity used to evaluate the triggering condition for the Intra-Frequency handover event.
IntraFreqHoA3RprtQuan		RSRP	RSRP	The quantity to be included in the measurement report for the Intra-Frequency handover event.



Event A3: Neighbour becomes offset better than serving.

A3-1 (Entering condition):

$$Mn + Ofn + Ocn - Hys > Ms + Ofs + Ocs + Off$$

A3-2 (Leaving condition):

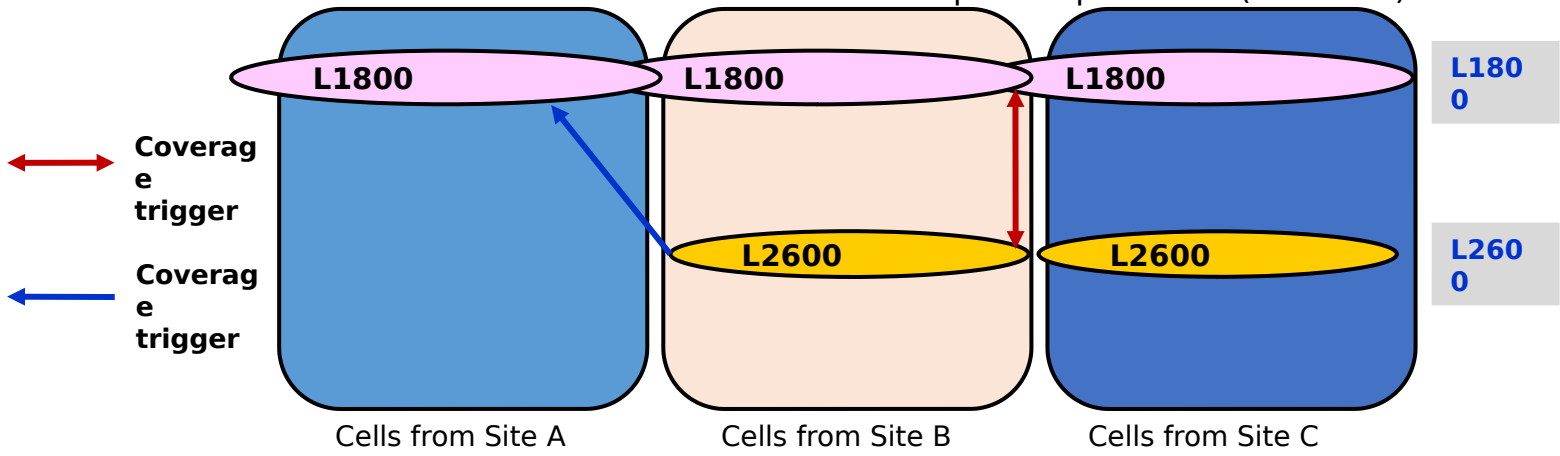
$$Mn + Ofn + Ocn + Hys < Ms + Ofs + Ocs + Off$$

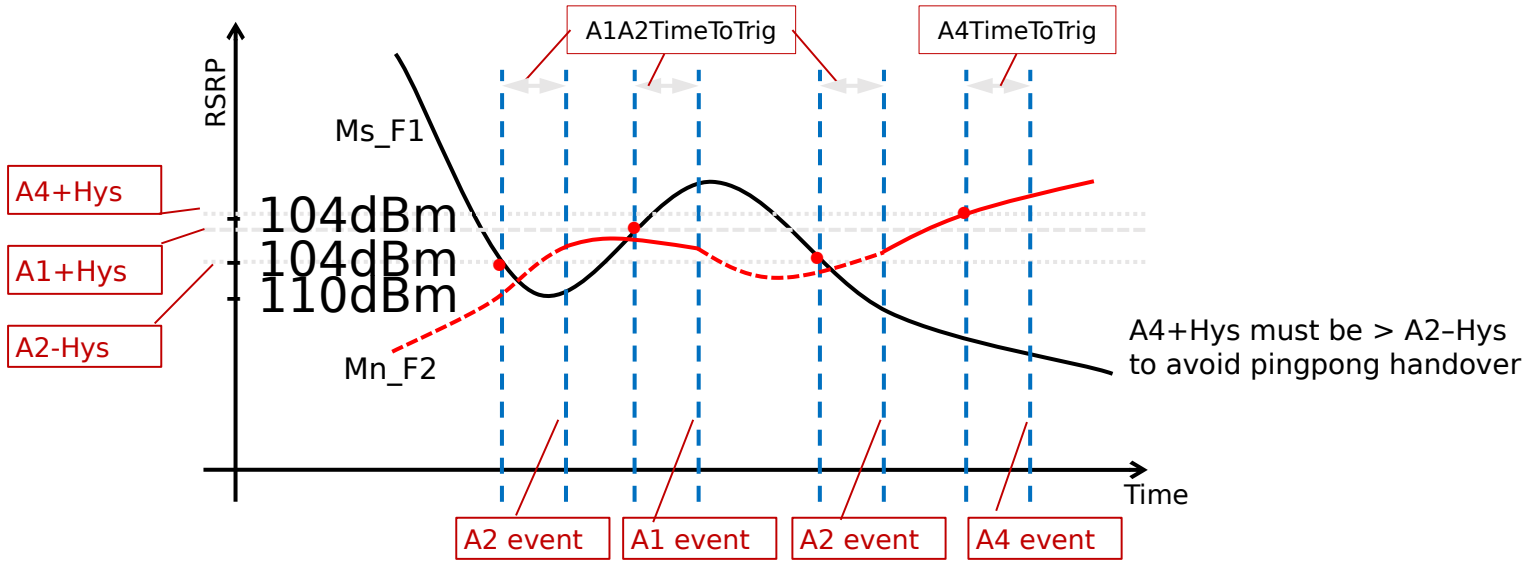
Mn :neighboring cell measurement result;
Ofn : frequency-specific offset for the frequency of the neighboring cell. It is specified by the ***QoffsetFreq*** parameter.
Ocn : cell-specific offset (CIO) for the neighboring cell. It is specified by the ***CellIndividualOffset*** parameter. If eNodeB does not deliver this parameter. UE uses the default value 0.
Ms : serving cell measurement result.
Ofs : frequency-specific offset for the serving frequency. It is specified by the ***QoffsetFreq*** parameter. This variable is contained in the associated measurement object IE in the measurement configuration.
Ocs : cell-specific offset for the serving cell. It is specified by the ***CellSpecificOffset*** parameter.
Hys :hysteresis for event A3. It is specified by the ***IntraFreqHoA3Hyst*** parameter and contained in the delivered measurement configuration.
Off :offset for event A3. It is specified by the ***IntraFreqHoA3Offset*** parameter. This A3-specific parameter is used to adjust the probability of triggering handovers.

- Ocs and Ocn denote CIO of serving and neighbor cells initialed from 0 and might be modified by MRO
- Ofn and Ofs are frequency offset which is 0 by default

LTE <-> LTE (Inter-Freq Handover – Coverage Based)

- Inter-Frequency HO will be triggered when UE moves out of the serving frequency coverage area
- UE will HO to the best cell that fulfill the Inter-Freq HO requirement (A4 event)

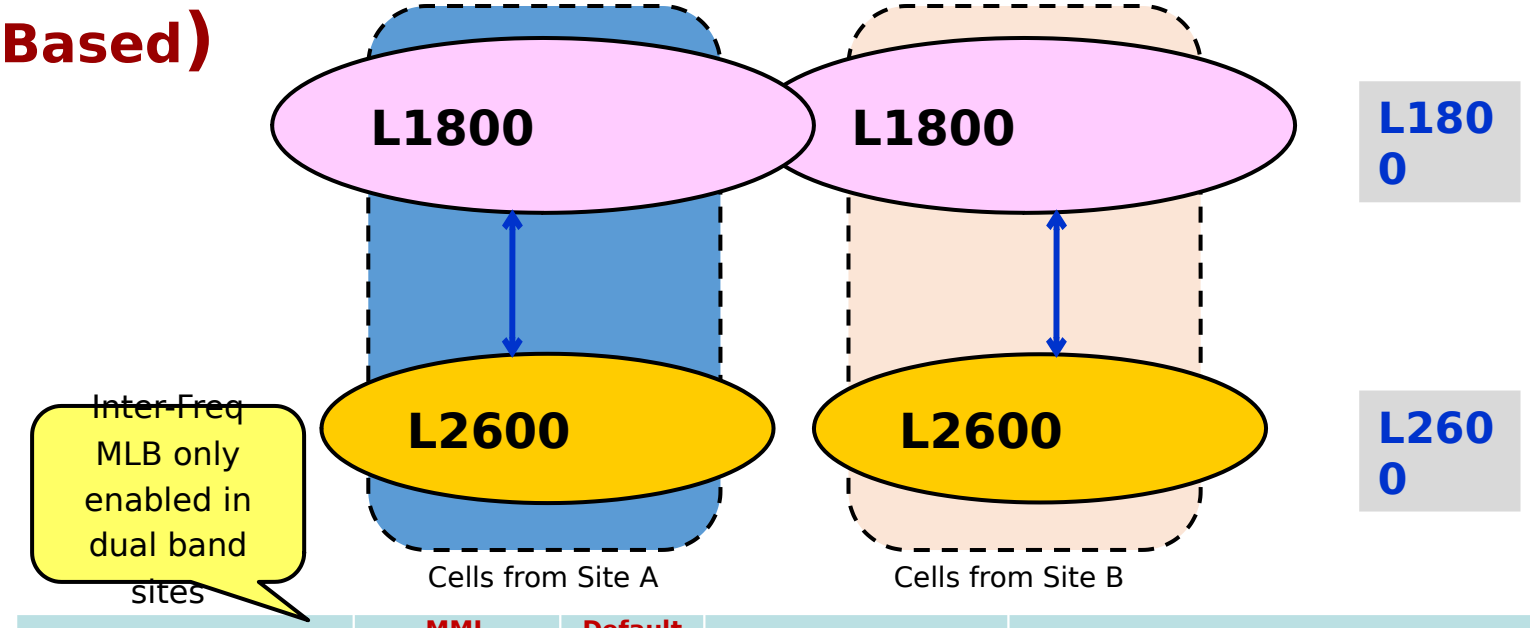




LTE <-> LTE (Inter-Freq Handover – Coverage Based)

LTE Parameter	MML Command	Default value	Recommended value	Comments
InterFreqHoA1A2Hyst	MOD INTERFREQHOGROUP	4	2[0.5dB] (1dB)	Hysteresis for event A1/A2
InterFreqHoA1A2TimeToTrig		640ms	640ms	Interfreq A1A2 time to trigger
InterFreqHoA1ThdRSRP		-105	-105dBm	RSRP threshold for Inter-Frequency measurement event A1. The actual threshold of quitting GAP measurement for Inter-Frequency handover is >-104dBm (-105dBm+1dB)
InterFreqHoA2ThdRsrp		-109	-109dBm	RSRP threshold for Inter-Frequency measurement event A2. The actual threshold of starting GAP measurement for Inter-Frequency handover is < -110dBm (-109dBm-1dB)
InterFreqHoA4ThdRsrp		-105	-105dBm	RSRP threshold for event A4 related to coverage-based Inter-Frequency handover. The actual threshold of starting Inter-Frequency handover is > -104dBm (-105dBm+1dB).
InterFreqHoA4Hyst		4	2[0.5dB] (1dB)	Hysteresis for event A4
InterFreqHoA4TimeToTrig		640ms	640ms	Interfreq A4 time to trigger
InterFreqHoA1A2TrigQuan	MOD INTRARATHOCOMM	RSRP	RSRP	quantity used in the evaluation for Inter-Frequency measurement event A1 or A2.
InterFreqHoA4TrigQuan		RSRP	RSRP	RSRP is suggested to be used to trigger measurement and handover for A4
InterFreqCoverHoSwitch	MOD CELLALGOSWITCH	InterFreqCoverHoSwitch-1	InterFreqCoverHoSwitch-1	To enable Inter-Freq coverage based handover

LTE <-> LTE (Inter-Freq Handover – Load Based)



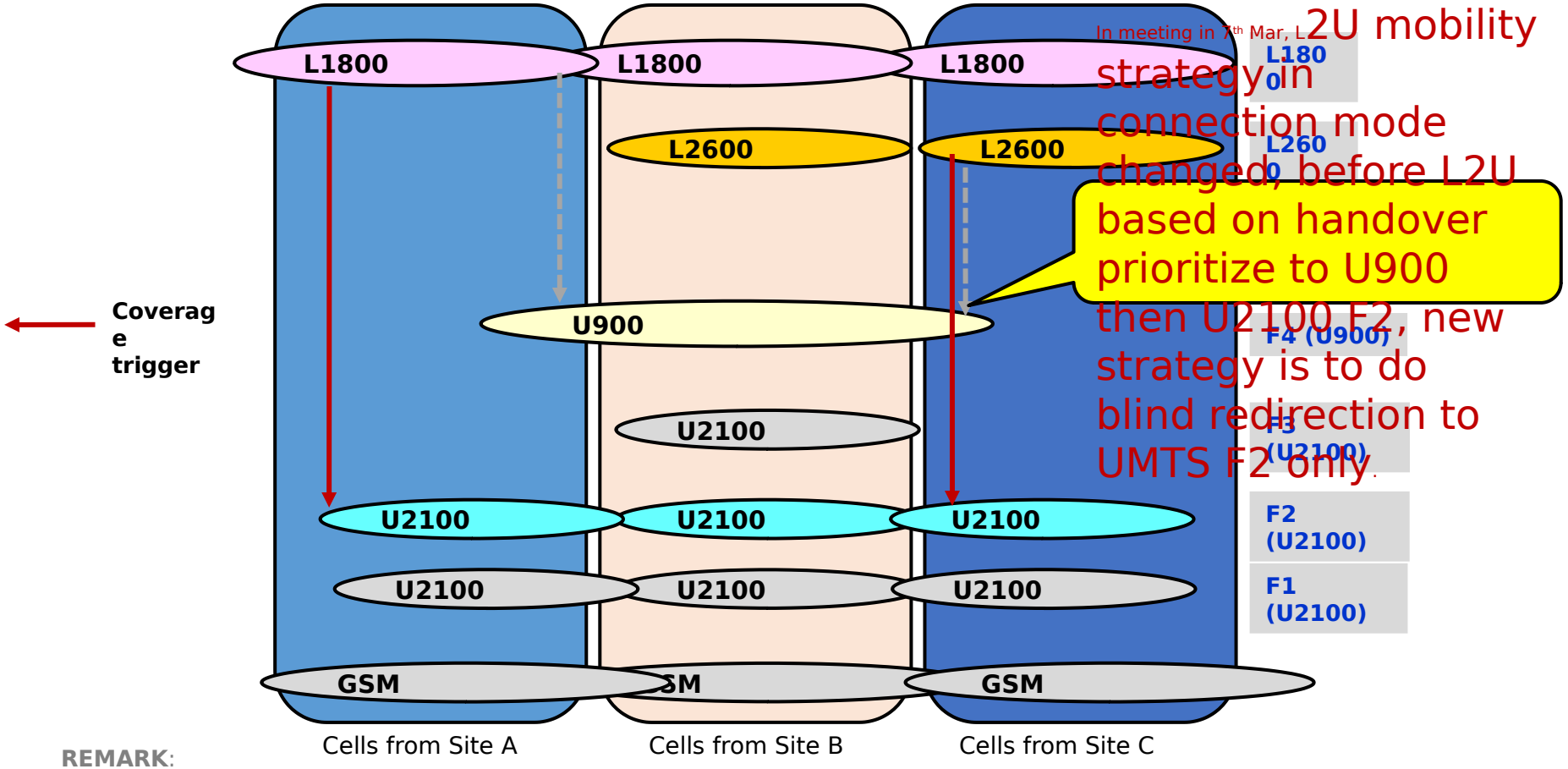
LTE Parameter	MML Command	Default value	Recommended value	Comments
MlbAlgoSwitch	MOD CELLALGOSWITCH	InterFreqMlbSwitch-0	InterFreqMlbSwitch-1	To enable Inter-Freq load balance (MLB). Intra-Freq load balance is not recommended due to Intra-Freq interference.
InterFreqMlbThd	MOD CELLMLB	60	60 (for L1800) 87 (for L2600)	InterFreqMlbThd + LoadOffset < 100 shall be followed
LoadOffset		8	8	Only when cell load > InterFreqMlbThd + LoadOffset then start MLB
LoadDiffThd		15	5 for the L1800 20 for the L2600	Objective to keep more user to L2600. So the L2600 diffethd=20. Only load difference between serving and target cell larger than this threshold then trigger the load sharing HO
InterFreqLoadBasedHoA4ThdRsrp	MOD INTERFREQHOGROUP	-103	-105dBm	RSRP threshold for event A4 related to load-based Inter-Frequency handover The actual threshold of starting load-based Inter-Frequency handover is > -104dBm (-105dBm+1dB)

LTE <-> LTE (Inter-Freq Handover – Load Based)

- eNodeB will evaluate the cell load every second. If load is keeping higher than (*InterFreqMlbThd* + *LoadOffset*) in 5 second period, then
  - If exist Inter-Freq neighbor within the same eNodeB then MLB will be triggered within the same eNodeB;
  - otherwise, eNodeB will communicate with neighbor eNodeBs (with HO SSR>=98%) through X2 interface in the next 30S then makes the decision and execution from the subsequent 30S time period;
  - eNodeB will do the decision and execution every 30S and continue the load communication if load is higher than the threshold defined by *InterFreqMlbThd*
- MLB decision: exist Inter-Freq neighbor cell with load lower to serving cell by *LoadDiffThd*.
- MLB execution:
  - eNodeB will choose UEs that support the Inter-Freq HO to measure the Inter-Freq cell
  - 5 UEs per batch with minimum RB assumption will be chosen
  - Once A4 event reported to eNodeB, MLB HO will be triggered

LTE -> UMTS (Inter-RAT Handover – Coverage Based)

- UE will reselect to/prefer to camp on LTE due to higher cell priority than UTRAN.
- L2600 has same or higher priority than L1800.

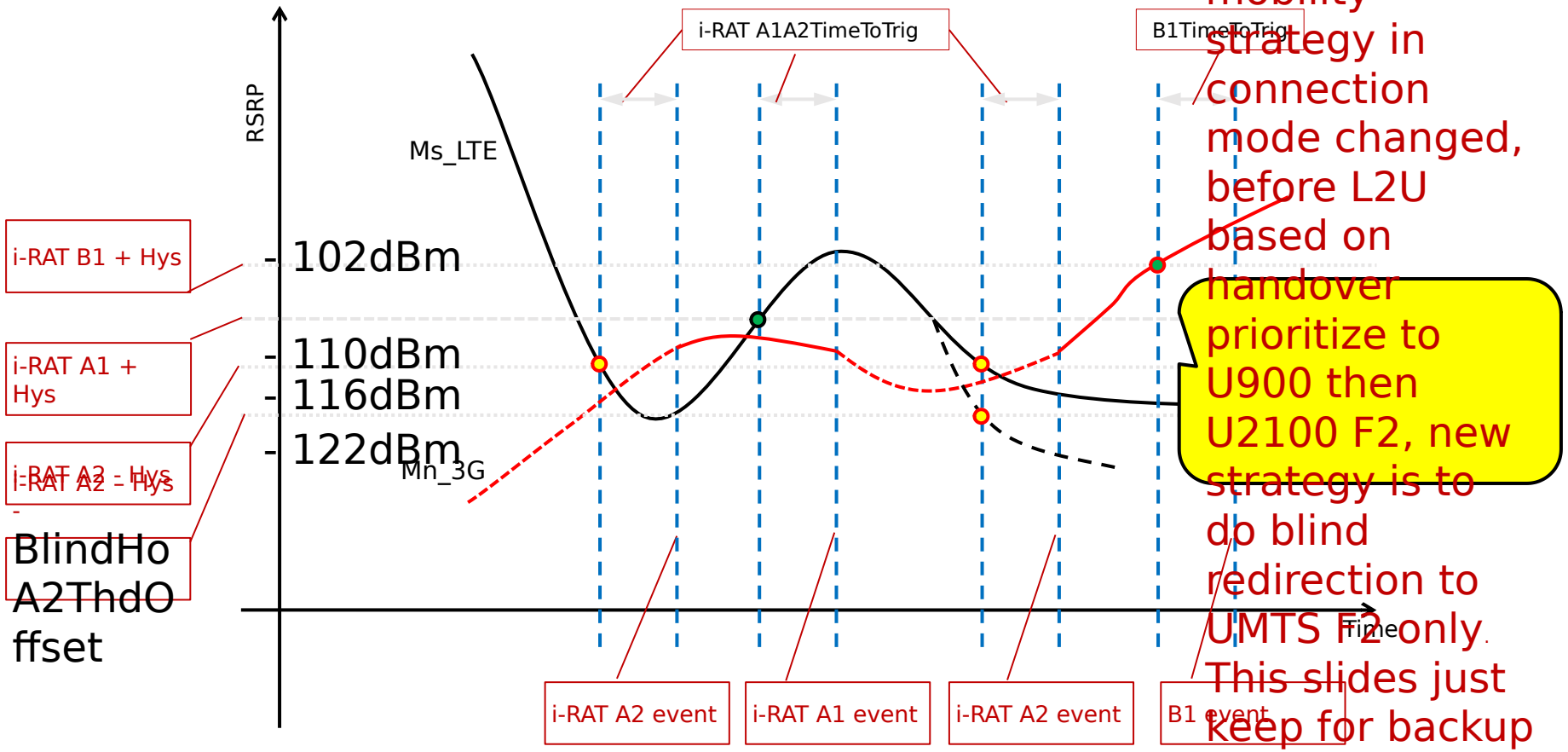


In meeting in 7th Mar, L2U mobility strategy in connection mode changed, before L2U based on handover prioritize to U900 then U2100 F2, new strategy is to do blind redirection to UMTS F2 only.

REMARK:

- L->U (F2) handover will be triggered only when LTE signal is low and UMTS signal fulfill requirement.
- U900 will be the priority target for L->U HO/CSFB and U2100 F2 will be the second candidate redirection target if U900 exist.
- If U900 is configured as first priority of i-RAT HO target, then configure only 1 U2100 neighbor for redirection if U900 not exist

LTE -> UMTS (Inter-RAT Handover – Coverage Based)



In meeting in 7th Mar, L2U mobility strategy in connection mode changed, before L2U based on handover prioritize to U900 then U2100 F2, new strategy is to do blind redirection to UMTS F2 only. This slides just keep for backup if needed in future.

REMARK:

- The trigger mechanism of L->U (F2) handover triggering is similar to that of Inter-Freq HO, only the threshold are for Inter-RAT
- i-RAT B1+Hys > i-RAT 2D event trigger HO from UMTS to GSM to avoid immediate following HO from UMTS to GSM
- If eNodeB receive an A2 event with LTE RSRP < InterRAT A2 Threshold – InterRatHoA1A2Hyst - BlindHoA2ThdOffset, blind redirection to UMTS will be triggered to the UMTS frequency with a blind HO priority

LTE -> UMTS – PS Connected Mode (1/2

LTE Parameter	MML Command	Default value	Recommended value	Comments
HoModeSwitch	MOD ENODEBALGOSWITCH	UTRANRedirectSwitch-0	UTRANRedirectSwitch-1	Enable Redirection to UTRAN switch
		UTRANPsHoSwitch-0	UTRANPsHoSwitch-0	Set to 0 to disable PS handover to UTRAN means to enable blind redirection to UMTS. If set to 1, then enable PS handover to UMTS based on measurement.
InterRatHoA1A2TrigQuan	MOD INTERRATHOCOMM	RSRP	RSRP	RSRP is recommended for LTE measurement.
InterRatHoUTRANB1MeasQuan		UTRAN_RSCP	UTRAN_RSCP	RSCP is recommended to evaluate UMTS signal due to R10 UE is required for EcN0 measurement.
InterRatHoA1ThdRsrp	ADD INTERRATHOCOMMGROUP	-111	-111 dBm	RSRP threshold for inter-RAT measurement event A1. The actual threshold of quitting GAP measurement for inter-RAT handover is >-110dBm (-111dBm+1dB)
InterRatHoA2ThdRsrp		-115	-115 dBm	Ensure (A2ThdRsrp - Hyst) < ThrshServLow to avoid immediate HO to UMTS after UE connected in LTE network The actual threshold to start GAP measurement for inter-RAT handover is < -116dBm (-115dBm-1dB).
InterRatHoA1A2Hyst		2	2 [0.5dB] (1 dB)	Hysteresis for event A1/A2
BlindHoA1A2ThdRsrp	Mod CELLHOPARACFG	-115	-115	Indicates blind redirection trigger threshold. The actual threshold to start the blind handover is <-116dbm(-115dbm-1dB)
InterRatHoUTRANB1ThdRscp	ADD INTERRATHOUTRANGROUP	-103	-103 dBm	RSCP threshold for event B1 used in HO to UTRAN The actual threshold of starting for inter-RAT handover is <-102dBm (-103dBm+1dB)
InterRatHoUTRANB1TimeToTrig		640	640ms	Time-to-trigger for event B1
InterRatHoUTRANB1Hyst		2	2 [0.5dB] (1 dB)	Hysteresis for event B1

BlindHoA2ThdOffset set to 0, then eNodeB will trigger blind redirection immediately once receive an Inter-RAT A2 event.

based on handover prioritize to U900 then U2100 F2, new strategy is to do blind redirection to UMTS F2 only.

Grey color only needed if LTE to UMTS handover is adopted.

Updata at 20-Nov-2014. Due to Eranb6.0 use this parameter to replace "BlindHoA2ThdOffset"

LTE -> UMTS – PS Connected Mode (2/2)

LTE Parameter	MML Command	Default value	Recommended value	Comments
UtranCellId	ADD UTRANEXTERNALCELL	NA	3G Cell ID	Eran 6.0 already separate the RNC ID and RNC cell ID. It different with 3G Indicates the ID of the external UTRAN cell. It uniquely identifies a UTRAN cell within a PLMN. The 28-bit ID of the external UTRAN cell consists of a 12-bit RNC ID (indicated by RNCId) and a 16-bit RNC cell ID (indicated by RNC Cell Id). The formula to calculate the UtranCellID of the external UTRAN cell is as: External UtranCellID = RNC ID x 65536 + RNC cell ID Huawei already plan to separate the 3G RNC ID and 3G Cell ID to 2 defferent parameters in future eRAN version. So far since all 3G cell ID is unique in Maxis 3G network, so it's proposes to just configure 3G Cell ID for this parameter
UtranFddTddType		UTRAN_FDD	UTRAN_FDD	Indicates the type of the UTRAN cell (FDD or TDD)
RncId		NA	NA	RNC ID of the external UTRAN cell
RacCfgInd		NOT_CFG	CFG	whether to set the routing area code (RAC) of the external UTRAN cell. This parameter must be set to CFG if the external UTRAN cell supports packet switched (PS) services
Rac		NA	NA	RAC of the UMTS cell
PScrambCode		NA	NA	Downlink Primary Scrambling Code of the external UTRAN cell
Lac		NA	NA	Location Area Code of the external UTRAN cell
CellName		NA	NA	The external UTRAN cell name.
[illegible]	ADD	[illegible]	16 (1~32) for the co-coverage	Configure one UTRAN (U2100 F2) cell as blind handover neighboring

* For the UE that doesn't support UTRAN measurement, blind redirection would be use, so it's recommended to configure one blind HO cell for the UTRAN frequency having best coverage.

In meeting in 7th Mar 2013, L2U mobility strategy in connection mode changed: before L2U based on handover prioritize to U900 then U2100 F2, new strategy is to do blind redirection to UMTS F2 only. So **only one dummy neighbor is needed**.

LTE -> UMTS (Inter-RAT by blind redirection)

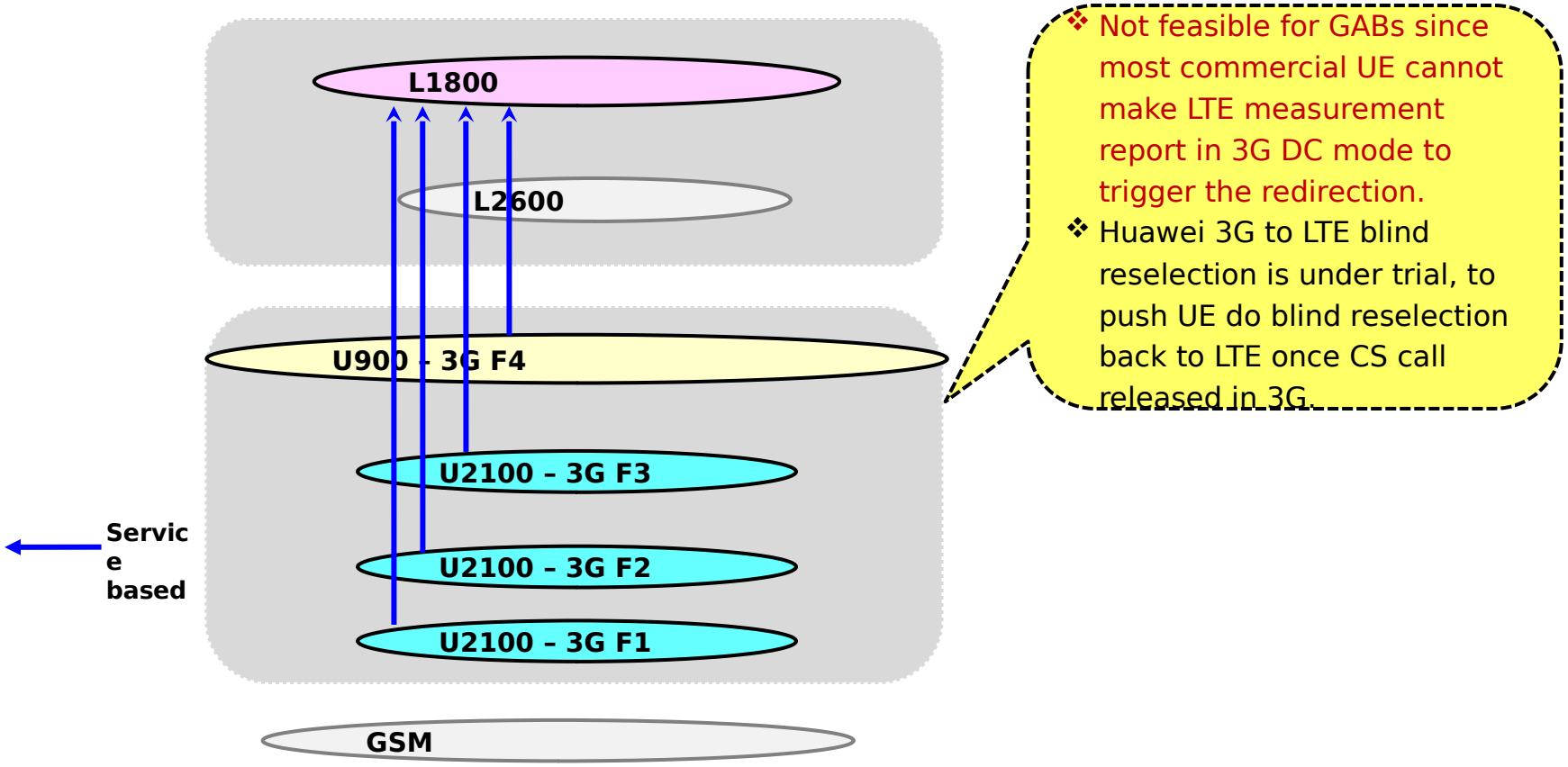
❖ **Coverage based LTE to UMTS redirection (triggered when LTE signal is poor):**
Once RSRP drop below the threshold when UE move out of LTE coverage area, eNodeB will send RRC release message to UE with a UMTS frequency to instruct UE leave LTE to continue service in 3G.

❖ **Service based LTE to UMTS blind redirection (CSFB):**
Before VoIP in LTE introduced, no CS service could be support by LTE, so fallback to 3G is necessary for voice call.
Once UE initial CS Service Request to LTE network and eNodeB receive CSFB indicator from MME, eNodeB will send RRC release message with a UMTS frequency to redirect the UE to 3G, then UE will search a suitable 3G cell to initial the CS call.

➢ A dummy UMTS neighbor with UMTS F2 will be configured with blind handover priority, to indicate the UMTS target frequency for UE to access after UE leave LTE. Whether UE will succeed access in 3G rely quality of 3G.

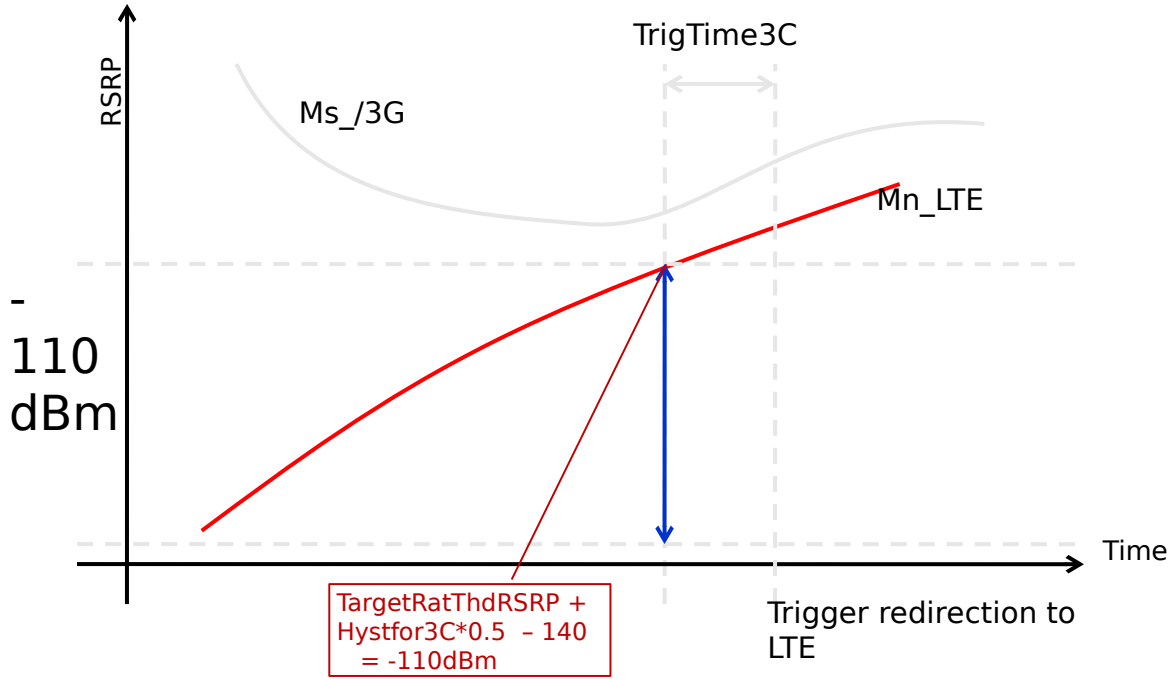
UMTS -> LTE redirection (Service Based)

- To ensure LTE user could goes back to LTE after CSFB to 3G, Service based U2L redirection is introduced


L1800
L2600
U900 – 3G F4
U2100 – 3G F3
U2100 – 3G F2
U2100 – 3G F1
GSM
Service based
Not feasible for GABs since most commercial UE cannot make LTE measurement report in 3G DC mode to trigger the redirection.
Huawei 3G to LTE blind reselection is under trial, to push UE do blind reselection back to LTE once CS call released in 3G.

REMARK:
All UMTS cells need to configure all surrounding LTE cells as neighbor for UMTS to LTE redirection
Only redirect to L1800 since L1800 has better coverage than L2600 and to be compatible with the LTE USs that only support L1800

UMTS -> LTE redirection (Service Based)

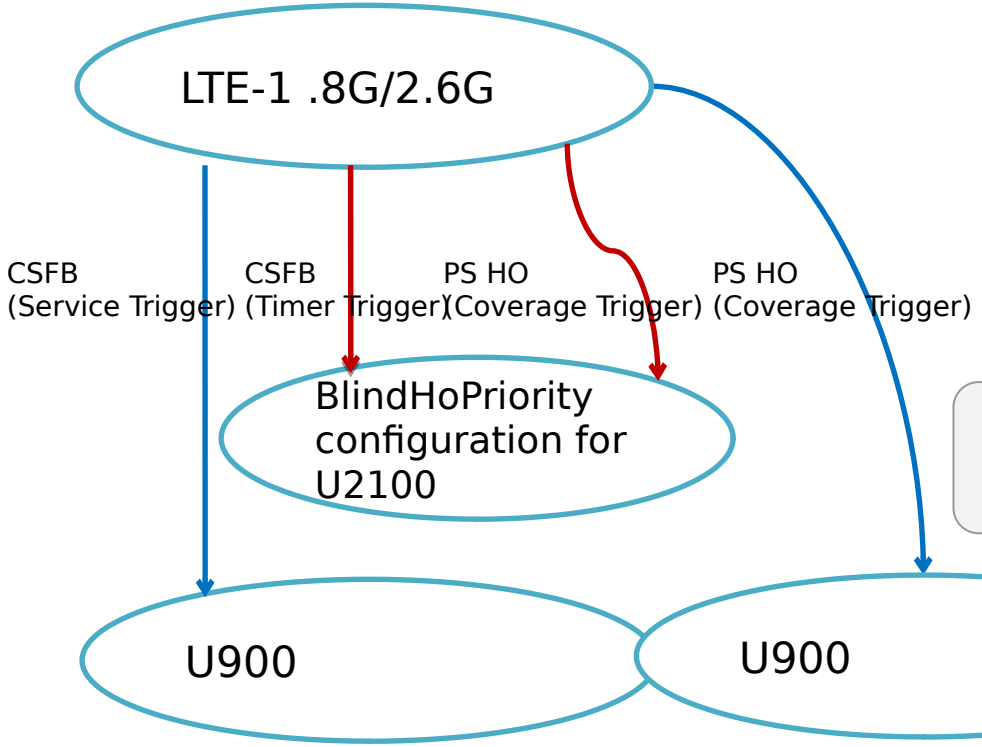


1) When a LTE capable UE release CS call and remain PS connection only, or UE active data services in 3G without CS service, RNC will send measurement control message to UE to measure LTE signal. So UE no chance to enter FACH mode before redirect to LTE.
2) Once UE report LTE RSRP > -110dBm, 3G RNC will redirect the UE from 3G to LTE
3) Due to the phone chipset limitation, UE don't support to measure LTE signal in 3G FACH mode. UE will reselect back to LTE once enter Idle mode.

UMTS -> LTE redirection (Service Based)

LTE Parameter	MML Command	Default value	Recommended value	Comments
LTECellIndex	ADD ULTECELL	NA	Cell ID of the co-located 3G F1 Cell ID	0~65535. Index of an external LTE cell
EUTRANCELLID		NA	eNodeBID x 256 + CellID	0~268435455. Trial shows this parameter could be any value for UMTS to LTE redirection actually.
TAC		NA	LTE TAC	Trial shows this parameter could be any value for U2L redirection
CellPHYID		NA	LTE PCI	This value MUST set correctly according to LTE cell planning, otherwise U2L redirection won't be triggered
SuppPSHOFlag		NotSupport	NotSupport	Don't enable PS Handover to LTE, means only redirection is allowed
RNCId	ADD ULTENCELL	NA	Source 3G RNC ID	To define LTE cell as UMTS cell neighbor. **All 3G cell need to define surrounding LTE cells as neighbor**
CellId		NA	Source 3G Cell ID	
LTECellIndex		NA	Target LTE Cell Index defined by *ADD ULTECELL*	
U2LTEMeasTime	SET UU2LTEHONCOV (RNC level)	30	30	If the LTE measurement time reaches this duration but U2L redirection still not performed, the LTE measurement is stopped, and the compressed mode will stopped if entered, to avoid affect 3G user throughput experience.
Hystfor3C	ADD UCELLU2LTEHONCOV (Cell Level - Optional)	4	4 [4*0.5=2dB]	
TargetRatThdRSRP		36	28	28+4*0.5-140 = -110dBm, to determine the RSRP threshold of target LTE signal for UMTS to LTE redirection
RabIndex	MOD UTYPRABBASIC	NA	All PS RAB need to set	To enable specified PS RAB should be redirection to LTE. All PS RAB bearer is recommended to set.
EUTRANSHIND		HO_TO_EUTRAN_SHALL_NOT_BE_PERFORM	HO_TO_EUTRAN_SHOULD_BE_PERFORM	
HoSwitch	SET UCORRMALGOSWITCH	HO_LTE_PS_OUT_SWITCH-0; HO_LTE_SERVICE_PS_OUT_SWITCH-0	HO_LTE_PS_OUT_SWITCH-1; HO_LTE_SERVICE_PS_OUT_SWITCH-1	To enable UMTS to LTE handover switch. But U2L Handover is disabled in U2L neighbor definition, so only U2L redirection will be performed

Inter-RAT PS/CS steering feature



Inter-RAT to U900 with priority:

- If exist U900 neighbor, then configure U900 as i-RAT neighbor and configure only 1 U2100 neighbor with BlindHoPririty for Redirection
- If exist U900 signal, then iRAT to U900
- If no U900 signal then blind redirection to U2100

1st try
2nd try

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- With the Inter-RAT PS/CS Steering feature, U900 is set as the High Priority layer of L->U HO/CSFB
  - Both 1st and 2nd try of PS HO is triggered by coverage
  - 1st try of CSFB is triggered by service and 2nd try of CSFB is triggered by timer (eNodeB starts a timer after receiving the CSFB Indicator. If the UE remains in the coverage of the eNodeB when the timer expires, eNodeB will perform a blind redirection procedure for CSFB. Currently, the timer is fixedly to 4 seconds in eRAN 3.0.)
- Behavior of the 2nd try is blind redirection
- If UE doesn't support Inter-RAT measurement or handover, then it will just redirect to U2100 frequency

Inter-RAT PS/CS steering feature

LTE Parameter	MML Command	Default value	Recommended value	Comments
FreqLayerSwtich	MOD eNodeBALGO Switch	UtranFreqLayer MeasSwitch-0	UtranFreqLayerMeasSwitch-1	Enable Frequency Layer selective HO from L->U
PsPriority	MOD UTRANNFREQ	High_Priority	High_Priority for U900 Low_Priority for U2100	Set U900 as the High Priority for L->U HO, if U900 Neighbor not configured then only Handover to the low priority U2100
CsPriority		High_Priority	High_Priority for U900 Low_Priority for U2100	

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LTE -> UMTS – CS Fall Back

LTE Parameter	MML Command	Default value	Recommended value	Comments
HoAlgoSwitch	MOD eNodeBALGOSwitch	UTRANCsfbSwitch: Off	UTRANCsfbSwitch: On	Enable CSFB to UTRAN switch
HoModeSwitch		BlindHoSwitch:Off	BlindHoSwitch:On	Set to On: together with UTRANPsHoSwitch-0, to determine that only blind redirection to UMTS is adopted for CSFB. If set to Off: Disable blind handover switch to do CSFB to UTRAN with measurement
CsfbHoUTRANB1ThdRscp	MOD CSFALLBACKHO	-106	-103dBm	RSCP threshold for event B1 that is used in CS fallback to UTRAN. The actual threshold of starting CSFB is > -102dBm (-103dBm+1dB).
CsfbHoUTRANTimeToTrig		40ms	40ms	Time-to-trigger for event B1 that is used in CS fallback to UTRAN.

Only needed if BlindHoSwitch is Off.

LTE Parameter	MML Command	Default value	Recommended value	Comments
InterRatHighestPri	MOD CSFALLBACKBLINDHOCFG	UTRAN	UTRAN	Indicates the high-priority RAT to be considered in blind handovers for CS fallback.
InterRatSecondPri	MOD CSFALLBACKBLINDHOCFG	GERAN	NULL	Indicates the medium-priority RAT to be considered in blind handovers for CS fallback.
InterRatLowestPri	MOD CSFALLBACKBLINDHOCFG	CDMA2000	NULL	Indicates the low-priority RAT to be considered in blind handovers for CS fallback.

For CSFB, need core network support also (MSC need upgrade to R9).

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This slides just keep for backup if needed in future.

Issue when 3G Only SIM card in 4G UE

If enable U2L reselection or redirection

- Enable U2L reselection or redirection will help 4G SIM in 4G UE could come back to LTE ASAP if UE fallback or reselection to UMTS, but the concern is that if a 3G only SIM card is put into a 4G UE:

1. Idle Mode if enable 3G to LTE reselection:
   - By default, USN will reject the 3G IMSI TAU with cause "Network Failure", then the UE may keep on trying to reselect to LTE and suffering even not able to get service from 3G
   - Huawei USN will map the reject error from "Network failure" to "15 no suitable cells in tracing area"
     Then UE with 3G SIM will not try to register to LTE cell under the rejected TAL anymore, until UE is power off and power on again, or UE moves to another TAL

2. Connection Mode if enable 3G to LTE redirection:
   - By default, 3G RNC will always instruct the 4G UE to measure LTE signal and perform U2L redirection once LTE signal better than the redirection threshold, even if USN send TAU reject with "No suitable cells in tracking area" to UE

Issue when 3G Only SIM card in 4G UE

- If USN send all the 3G IMSI authentication request to HSS, then HSS will reject to USN, then USN will map the reject code (5420 DIAMETER ERROR UNKNOWN EPS SUBSCRIPTION or 5001 unknown user) to Cause Value 15 No Suitable Cell in TA
- Huawei USN V9R1SPC300 and above version can start counter for the error code from HSS 5420 and 5001 for each UE, if reach a certain times (default 3, recommend 1), then USN will send RAB Assignment Request which consists of "Handover to E-UTRAN shall not be performed" to RNC when user try to activate service in 3G, then RNC will not trigger LTE measurement for this UE even it is a 4G UE
- When later if the rejected 3G user subscribe LTE, and if the UE already succeed an TAU or Attach either by the UE automatically reselect to LTE (after the UE power off then power on) or the user manually reselect to LTE, then USN will clear the counter then the UE can redirect to LTE from 3G
- Since UE will store the rejected TAL by cause value 15 into a "black list", to avoid any service effect, it is recommend the user power off then power on the UE to clear all forbidden TAL from the "black list", thus UE will reselect back to the TAL that UE was previous rejected in before subscribe LTE.